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1997

EPA Superfund
Record of Decision:

NORTH BELMONT PCE
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NORTH BELMONT, NC
09/24/1997

<IMG SRC 972030>

NORTH BELMONT PCE SITE

NORTH BELMONT, GASTON COUNTY
NORTH CAROLINA

RECORD OF DECISION

<IMG SRC 97023A>

REGION IV
ATLANTA, GEORGIA
SEPTEMBER, 1997

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

North Belmont PCE Site
North Belmont, Gaston County, North Carolina

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the North Belmont PCE Site in North Belmont, Gaston County, North Carolina, chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and, to the extent practicable, the National Contingency Plan (NCP). This decision is based on the administrative record file for this Site.

The State of North Carolina concurs with the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this Record of Decision, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

This remedy addressees the principle threat posed by the Site. The major threat is the contaminated groundwater emanating from beneath the Site.

The major components of the selected groundwater remedy include:

- Installation of an in-well vapor stripping system to treat contaminated groundwater that is above Maximum Contaminant Levels or the North Carolina Groundwater Standards, whichever are more protective for each particular contaminant;

- In-situ bioremediation;

- Connection of affected residences, businesses, churches, etc currently not on city water to the City of Belmont or Gaston County public water supply;

- Optional wellhead treatment for affected private wells; and

- Continued analytical monitoring for contaminants in groundwater.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technology to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. Since this remedy may result in hazardous substances remaining on-site above health based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

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1.0 SITE NAME, LOCATION, AND DESCRIPTION

A. Introduction

The North Belmont PCE Site (hereinafter referred to as the "Site" or the "North Belmont Site") consists of two closed dry cleaning operations located in North Belmont, Gaston County, North Carolina (latitude 35516'24.5" and longitude 81503'04.5"). These two areas are referred to as "Source Area A" and "Source Area B" (Figure 1-1).

B. Site Description

Source Area A is located at Roper's Shopping Center in Land Lot 5, Parcel 15-18A on Woodlawn Avenue. The shopping center includes Roper's Furniture Store, a Baptist church, and a cabinet manufacturing shop. The former dry cleaner facility is approximately 0.75 acres in size and is bounded to the east and west by residential neighborhoods; to the north by a cemetery and an undeveloped wooded tract; and to the south by North Belmont Elementary School.

Two mobile homes are located on the property in the back of the shopping center, each occupied by one tenant. There was believed to be a buried septic tank behind the shopping center building near the mobile homes. A flea market is held on the lawn between the shopping center and the elementary school five days per week. The shopping center is fenced along the southern and eastern boundary. The western portion of the shopping center is covered with an asphalt parking lot, and the eastern portion is covered with soil and grass. The terrain is relatively flat with a gentle slope toward the northeast to an unnamed tributary of Fites Creek.

Source Area B is located at the northeastern corner of Acme Road and Suggs Road in Land Lot 11, Parcel 15-18. This parcel has been converted to residential property. The majority of the area surrounding Source Area B is residential with a few small businesses. A cabinet shop is located to the north.

In addition, a previous refrigerator repair shop and a machine shop were also suspected to be potential sources of contamination. The refrigerator repair shop, now closed, is located at the intersection of Julia Street and Acme Road in land lot 15-18A parcel #32. This is a small commercial strip area with residential property surrounding the Site, except for a cabinet shop and a well drilling company located to the east. The machine shop is located at the corner of Acme and Centerview Roads and is encompassed by residential neighborhoods. Figure 1-2 shows the approximate RI/FS study area.

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C. Demography

The Site is located in Gaston County, North Carolina, which had a 1990 census population of 175,093. The town of Belmont had a population of 8,434, with 3,040 households.

Based upon a house count from USGS topographic maps, the population within one mile of the North Belmont Site is estimated to be 3,718. The nearest residence is located on the Site.

D. Surrounding Land/Water Use

The principal land use in the immediate vicinity of the Site is residential. Some commercial uses occur along Woodlawn Avenue and along Acme Road.

E. Topography

Gaston County, North Carolina lies in the central portion of the Piedmont Physiographic Province between the Appalachian Mountains to the west and the Atlantic Coastal Plain to the east. The Piedmont is primarily characterized as rolling uplands although the county's western area contains some northeast trending ridges. The elevation of Source Area A is approximately 760 feet above mean sea level (msl), and the elevation of Source Area B is approximately 730 feet above msl. The elevations within a one-mile radius of the Site range from 600 to 800 feet above msl. The topography of the Site is composed of low ridges accentuated by numerous small stream valleys. In general, the topographic changes are gradual, except for occasional steep-sided stream valleys. Specifically, the site topography is dominated by a ridgeline on the western half of the Site. The former Untz Dry Cleaning facility, located within the present Roper Shopping Center, was located along the center of the ridgeline. East of this ridgeline, the topography is dominated by slopes trending from the southwest to the northeast towards a small tributary of Fites Creek (unnamed tributary "A") that has headwaters adjacent to the Roper location.

The unnamed tributary lies along the northern edge of the Site and flows to the east. Site topography along the eastern perimeter is also affected by the presence of another small stream along the extreme eastern edge of the Site. This stream, which is also an unnamed tributary of Fites Creek (unnamed tributary "B"), flows northeast and into the aforementioned stream. West of the ridgeline the topography slopes to the west and eventually towards another stream further to the west.

F. Climate

The climate is moderate with approximately one half of the winter days falling below freezing. Little snow falls and the occasional heavy snow usually melts within one or two days. The average freeze-free period is 216 days. The summers are warm with temperatures into the 90!F range.

G. Geology

The Site is located within the central portion of the Charlotte Belt of North Carolina. The rock types that underlie this terrain are dominated by granitic type rocks, metavolcanics, and gneisses and schists of varying types. The rock types are of varying metamorphic grade and all rock units trend parallel with the strike of the Appalachian Mountains, which is typically northeast to southwest. These same units typically dip to the southeast along with the regional topographic trend. Structurally, the area is complex with rock units displaying one or two types of metamorphism or structural changes, such as faulting or folding. A large, unnamed fault is located approximately six miles to the west of the Site.

According to the Geologic Map of North Carolina (1985), the Site is underlain by foliated to massive metamorphosed quartz diorite and massive to weakly foliated, hornblende rich granitic type rock. These rock units have undergone periods of deformation that have produced folding and fracture planes in the rock, as well as brittle zones where the rock is actually crushed, sheared, or faulted in some manner. As these rock types become weathered, soil profiles develop that are characteristic of the original rock (also referred to as saprolite). For example, the granite rock tends to weather to a clay rich loam or a dry rich sand, especially with depth. The sand originates from quartz content within the original parent rock; in some cases, larger grains of quartz sand can be found in the saprolite.

As described above, the bedrock types have been fractured during metamorphic phases and, in some cases, the fracture places have been "resealed" by quartz. As the rock weathers, these quartz fillings are retained in the soil indicating that fractures existed in the rock. In addition, remnant fractures can be seen in the soil profile without quartz infilling as indicated by the presence of iron staining along the fracture plane. The iron staining, which is also referred to as the mineral limonite, is a result of groundwater leaching iron from the surrounding material, and as the groundwater travels along a fracture plane, the iron is being redeposited along the plane. Fracture planes were also detected during drilling as zones of weak to incompetent rock that were not resistant to the cutting action of the drill bit. These fracture zones, or secondary porosity features, were typically saturated.

During the field activities, the soil profile varied with each location; however, a common pattern was observed. From top to bottom, the materials consist of a saprolite layer, a partially weathered rock zone, and the underlying fractured crystalline bedrock. The saprolite is clay-rich, residual material derived from in-place weathering of bedrock. Typically, the saprolite is silty clay near the surface. With increasing depth, the amount of mica, silt, and fine-grained sand and gravel tend to increase. Remnant fracture planes with quartz infilling appear in this layer. The saprolite zone is thickest (approximately 125 feet) along the ridgeline on the western edge of the Site, thinning towards the lower elevations or stream valleys to approximately 30 feet in thickness. Underlying the saprolite is a partially weathered rock layer derived from the weathering of bedrock that ranges in thickness from approximately 10 to 50 feet. This layer is composed of saprolite and fragments of weathered bedrock. Particle sizes range from silts and clays to large boulders of unweathered bedrock. The weathering occurs in bedrock zones less resistant to physical and chemical degradation (i.e., fault zones, stress relief fractures, and mineralogic zones).

The predominant rock types, based on rock cores obtained during bedrock monitoring well drilling, appear to be metamorphosed quartz diorite and metamorphosed granite or granitic gneiss. The bedrock is fractured and these fractures contain quartz deposits that remain unweathered in the saprolite. The rock quality designation (ROD) which is the measure of the quality of a rock mass ranged from 0 to 45 percent; ROD values less than 50 percent indicate very poor to Poor rock and generally high in fractures.

H. Hydrogeology

Regionally, the water bearing units that underlie the Site and surrounding areas represent an aquifer system consisting of metamorphosed and fractured quartz diorite and granitic type rocks in varying proportions and thicknesses. Geologic structures that produce high-yielding wells include contact zones of multilayered rock units, zones of fracture concentration, and stress-relief fracture zones. According to LeGrand and Mundorff (1952), wells in Gaston County that are set within granite have an average depth of 165 feet and an average yield of 18 gallons per minute. Within this area, LeGrand and Munclorff indicate that well depths range from 85 to over 1,000 feet and that well yields range from 2.5 to 116 gallons per minute. The aquifer system underlying the Site generally consists of the saprolite/partially weathered rockaquifer and the underlying bedrock aquifer; however, interconnection between these units is likely which would influence contaminant transport.

In the Site area, the top of the water table is typically found in the saprolite aquifer and will generally mimic the overlying land surface. The depth to water across the area ranges from approximately 3 to 35 feet below ground surface. The relatively shallow depths to water occur within the basin of the stream located along the northern edge of the Site. The greatest depth to water is found along the ridgeline on the western portion of the plume area, the location of the Roper's Shopping Center and North Belmont Elementary School.

Using groundwater elevations collected in November 1996 and potentiometric maps drawn from these groundwater elevations, groundwater within the saprolite and bedrock aquifer generally flows to the northeast to east across the site. Based upon the potentiometric contours, Roper's Shopping Center appears to be positioned within the top of a localized groundwater mound with potentiometric contours emanating in a semi-circular pattern from this point. Insufficient data of groundwater elevations along the western edge of the Site prevent completion of the potentiometric contours.

Based on depth-to-water measurements for monitor wells MW-13 and MW-21, groundwater discharges from the saprolite and bedrock aquifers into the small stream along the northern edge of the Site; however, fractures present in the partially weathered rock and bedrock will affect the direction of groundwater flow and relict fractures present in the saprolite may also control groundwater flow directions. According to Harned (1989), while working in the Piedmont Province of Guilford and Mecklenburg Counties of North Carolina, most of the natural flow in the bedrock system is probably confined to the upper 30 feet of bedrock where fractures are concentrated, and the overlying transition zone which apparently has the highest hydraulic conductivity of any part of the hydrogeologic system.

I. Hydrology

The Site is located between the Catawba River and the South Fork of the Catawba River. Gaston County is drained by the Catawba River, which flows north to south and forms the east boundary of Gaston County. Surface water drainage from the Site is to an intermittent creek (unnamed tributary "A") located approximately 1000 feet to the north. The intermittent creek flows 0.5 miles east and joins another intermittent creek (unnamed tributary "B") to form an unnamed perennial stream. The unnamed stream continues approximately 0.75 miles to the confluence with Fites Creek. The surface water pathway continues along Fites Creek approximately 1.5 miles where it merges with the Catawba River.

The Catawba River is classified as WS-111 by the North Carolina Water Quality Standards. These standards are established under the North Carolina Administrative Code (Title 15, Chapter 2, Subchapter 2B). The code establishes classes of freshwaters based on discharges to the water body and its quality. Chemical quality standards for surface waters are also established under the Code (Section 2B.0211). Flow rates in Fites Creek near Catawba Heights were calculated to be 4.6 cubic feet per second (cfs). The average flow rate along the Catawba River at US 85 near Belmont is 2,109 cfs.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

A. Site History

Source Area A was operated by the Untz family from 1960 to 1975 as a dry-cleaning establishment. A boiler located behind the building was used to "distill" the waste dry cleaning solvents. The spent solvent residue from the boiler distillation unit was reportedly disposed onto the ground surface behind the building, and spent solvents were disposed through the on-site septic tank system. Source Area B was also operated by the Untz's family prior to moving the dry cleaning establishment to Roper's Shopping Center. Source Area B was discovered during the site reconnaissance in October 1995 from an interview with a local resident.

In February 1991, the Gaston County Health Department sampled the well that provided water to the North Belmont Elementary Scbool and two single family dwellings. This sampling was associated with an effort by the County to evaluate community water supplies for volatile organic compounds (VOCs) contamination. The results of this sampling indicated significant VOC contamination in the well.

EPA Region 4 Emergency Response was notified. EPA and the Gaston County Health Department sampled 25 drinking water wells. Tetrachloroethene (PCE), trichloroethene (TCE) and cis-1,2-dichloroethene (1,2-DCE) were detected in sixteen samples. PCE concentrations were found as high as 15,000 parts per billion (ppb). The elementary school was immediately connected to the City of Belmont water system. Twenty-nine of the neighborhood drinking water wells were taken out of service and connected to the Belmont city water service. All but 12 of the residential wells were subsequently abandoned by grouting them to the surface; 12 wells remained intact and were proposed as monitoring wells. Seven residences in the neighborhood were informed of the contamination but chose to continue to use their wells and not connect to city water. Wells still in use in the vicinity of the Site were scheduled to be sampled by the Gaston County Health Department. However, these wells were not sampled until EPA's investigation in 1996.

B. Previous Investigations

In July 1991, the EPA Environmental Response Team/Response Engineering and Analytical Center (ERT/REAC) installed one bedrock and four overburden monitoring wells in the immediate area of Source Area A (Figure 2-1). Data from these wells was used to characterize the residuum and saprolite, the bedrock lithology and fracturing, and the primary groundwater flow direction at the Site. Sample analyses from the five monitoring wells revealed the presence of volatile organic compounds.

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A Site Inspection Report was prepared by the North Carolina Department of Environment, Health, and Natural Resources (NCDEHNR) Superfund Section in July 1993. A total of eight on-site soil samples and two background soil samples were collected for analysis. Two samples collected from the area of monitoring well MW-01 revealed the presence of acetone at concentrations of 1,212 ppb and 150 ppb. The State was unable to locate a septic tank on the north side of the shopping center thought to be a possible source of the VOC groundwater contamination.

Elevated levels of the pesticide chlordane were found in several soil samples collected from the elementary school property. Based upon the carcinogenic nature of the compounds detected in the ground-water plume, an Expanded Site Investigation was recommended. Based on the results of the study concerning the school property, the Gaston County Health Department collected an additional 23 soil samples for chlordane analysis. One sample revealed chlordane at a level of 5400 ppb; however, the Gaston County Toxicologist concluded that this level of chlordane in the soil around the school did not pose an unacceptable health risk.

In March 1996, EPA sampled 25 residential wells (seven were converted to monitoring wells in 1991) in the vicinity of the Site to update the 1991 analytical results (Figure 2-2). As a result of these findings, one additional residence was connected to city water. This well did not contain any contaminants in the initial 1991 sampling event.

High levels of trichlorofluoromethane were found in three of the wells, and as a result, this compound may have masked low concentrations of the other volatile organics. Therefore, EPA resampled these wells in April 1996.

C. Site Regulatory Actions

This Site is not on the NPL. The NPL listing package is currently being prepared and will be based on all data results to date, including the remedial investigation.

EPA sent a notice letter to Mr. Roper in August 1995 offering the opportunity to conduct the RI/FS. The notice letter also informed the PRP of his potential liability for past and future site costs. Owners of residential properties as well as Mr. Roper were also sent letters requesting access. The operator of the two dry cleaning establishments, Mr. Untz, is deceased.

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3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

Pursuant to CERCLA Sections 113(k)(2)(B)(I-v) and 117, the RI/FS Report and the Proposed Plan for the Site were released to the public for comment on July 29, 1997. These documents were made available to the public in the administrative record located in an information repository maintained at the EPA Docket Room in Region IV and at the Gaston County Public Library in Belmont, North Carolina.

The notice of the availability of these documents was published in the Gaston Gazette and the Belmont Banner on July 29, 1997. A pubic comment period on the documents was held from July 29, 1997 to September 12, 1997. A copy of the notice was mailed to the site mailing list which contains names of community members and interested parties. In addition, a public meeting was held on August 7, 1997. At this meeting, representatives from EPA answered questions about the Site and the remedial alternatives under consideration. Meetings with city and county officials were also held.

Other community relations activities included:

- Established an information repository
- Conducted community interviews
- Prepared an extensive mailing list
- Developed a community relations plan
- Issuance of a fact sheet on the RIFS process in June 1996
- Issuance of a fact sheet on the proposed plan in July 1997
- Notice of availability of information in repository and public meetings on June 16, 1996 and August 7, 1997
- Informed citizens of the Technical Assistance Grant and Community Advisory Group program (literature placed in repository).

4.0 SCOPE AND ROLE OF RESPONSE ACTION WITHIN SITE STRATEGY

As with many Superfund sites, the North Belmont PCE Site is very complex. However, all aspects of the cleanup will be addressed concurrently and the Site has not been divided into phases or "operable units."

This ROD will present a final remedial action for the entire Site.

5.0 SUMMARY OF SITE CHARACTERISTICS

During the RI, surface and subsurface soil, sediment and surface water, and groundwater were sampled to determine the nature and extent of contamination. For a more detailed summary, refer to the RI Report.

Based upon the Site Inspection Report for the North Belmont PCE Site, NCDEHNR, July, 1993, the main contaminants at the Site are tetrachloroethylene (PCE), trichloroethylene (TCE), and cis-1,2 dichloroethylene (CIS-1,2 DCE). The following discussion highlights these constituents as well as any chemical constituents which exceed the National Primary Drinking Water Regulations (NPDWR) Maximum Contaminant Levels (MCLs), the National Secondary Drinking Water Regulations (SMCLs), Federal Ambient Water Quality Criteria (AWOC), EPA Region 3 Risk-Based Concentrations (Smith, 1996) and the North Carolina Groundwater Classification and Standards-Groundwater Quality Standards of the North Carolina Administrative Code (15A NCAC 2L 0202(c)), and North Carolina Water Quality Standards applicable to Surface Waters (15A NCAC 2B 0200).

A. Source Area/Soil Investigation

Four locations were investigated as potential source areas: the closed dry cleaning facility located at Ropers Shopping Center, the closed dry cleaning facility located in the northeastern quadrant of the Suggs Road and Acme Road intersection, the refrigerator repair shop located north of the intersection of Julia Court and Acme Road, and the machine shop located in the southern quadrant of the intersection of Acme and Centerview Road. Soil borings, temporary monitoring wells and permanent monitoring wells were used to search for the location of active sources such as contaminated subsurface soils since the original sources (the boiler distillation unit, or the septic tank) of contamination are no longer present.

In June and July 1996, a total of sixteen soil borings were installed within the study area. The locations of these soil borings are shown in Figure 5-1. The soil borings were installed to locate active sources since the original sources of contamination are no longer present, as well as, to determine the extent of contaminated subsurface soils. Soil borings SS-1 thru SS-10 were installed to approximately 10 feet below the groundwater surface; HA-1 and HA-2 were installed to hand auger refusal; and borings SPT-1, MW-6, MW-10 and TW-14 were drilled to the top of bedrock, or to auger refusal depth, whichever was first encountered.

Soil samples were collected for chemical analyses from borings SS-1 thru SS-5 at five foot intervals for the upper 20 feet and every ten feet thereafter until the termination depth of the borehole was reached.

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The subsurface soils were divided into six zones: 5 feet, 10 feet, 15 feet, 20 feet, 30 feet, and 40 to 110 feet below ground surface. Iron, manganese, and vanadium were found above the Region 3 Risk Based Concentrations. These samples were submitted for full TCL/TAL analysis scan.

The subsurface soils encountered at the 20 foot zone and at the 40 to 100 foot zone, except for SPT1/82' and MW6/110' were only analyzed for VOCs; SPT1/82' and MW6/110' were also analyzed for extractable organics and pesticides/pcbs. No constituents exceeded the Region 3 Risk Based Concentration Values for these zones.

B. Surface Water and Sediment Investigation

Three surface water and three sediment samples were obtained from the locations shown in Figure 5-2. The metals aluminum, iron, lead, manganese, and zinc were found. The semi-volatile benzo-a-pyrene was found in one sediment sample.

C. Residential Well Survey

A residential well survey was conducted in October 1995 and the results of this survey are shown on Figure 5-3. Groundwater is considered as a Class IIA Aquifer since it is currently used as a drinking water source (USEPA, 1988, Guidance on Remedial Actions for Contaminated Groundwater on Superfund Sites). The State of North Carolina classifies the aquifer as a GA aquifer since it is a present drinking water source and contains naturally occurring chloride concentrations less than 250 milligrams per liter (North Carolina Administrative Code, Title 15, Subchapter 2B.0201).

D. Private Well Sampling

During the period of March thru September 1996, forty-four(44) residential wells were sampled in the vicinity of the North Belmont PCE Site to determine the water quality of the residences drinking water. Six of the 44 wells were resampled due to the elevated levels of trichloroflouromethane detected in the initial sampling event; the quantitation limit for PCE, TCE and cis-1,2 DCE were above the Federal MCLs. All samples were collected for VOC analyses with approximately 25 percent submitted for full TCL/TAL scan. Table 5-1 provides the analytical results of the sampling events.

E. Shallow Groundwater Investigation

In June 1996, shallow temporary monitoring wells were installed at the Site to define the shallow groundwater plume and to investigate possible active source areas at the North Belmont PCE Site.

EPA collected groundwater samples from shallow temporary monitoring wells in June, 1996 (Figure 5-4). The wells were sampled to determine the shallow groundwater plume. The shallow groundwater plume is approximately 30 to 35 feet below the land surface. The contaminant isopleth for PCE is shown on Figures 5-5, and the results of the sampling are noted in Table 5-2.

The top of bedrock sampling results were combined for both the temporary and the permanent groundwater monitoring wells to obtain the contaminant isopleth for PCE as shown on Figures 5-7.

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<IMG SRC 97203I>

TABLE 5-1. MAIN ORGANIC CONTAMINANTS IN BEDROCK GROUNDWATER PLUME, RESIDENTIAL DRINKING WATER WELLS

STATION	LOT	PARCEL	DEPTH	CASING	PCE	Q	TCE	Q	1,1DCE	Q	CLEM	Q
UNITS			FT	FT	UG/L		UG/L		UG/L		UG/L	
NB-309-PW	15-18	2.01	510		18.00	A	0.94	AJ	1.00	U	1.00	U
NB-003-PW	15-18	2.01	510		12.00	A	0.68	AJ	5.00	U	5.00	U
NB-004-PW	15-18	3.05	528	400	5.00	U	5.00	U	5.00	U	5.00	U
NB-350-PW	15-18	4.06			1.00	U	1.00	U	1.00	U	1.00	U
NB-351-PW	15-18	4.08			1.00	U	1.00	U	1.00	U	1.00	U
NB-312-PWS	15-18	12			1.00	U	1.00	U	1.00	U	1.00	U
NB-312-PW	15-18	12			1.00	U	1.00	U	1.00	U	1.00	U
NB-305-PW	15-18A	21			36.00		2.20		1.50		1.00	U
NB-011-PW	15-18A	29			5.00	U	5.00	U	5.00	U	5.00	U
NB-046-PW	15-18A	31			5.00	U	5.00	U	5.00	U	0.87	AJ
NB-012-PW	15-18A	39			5.00	U	5.00	U	5.00	U	5.00	U
NB-355-DPW	15-18A	40			1.00	U	1.00	U	1.00	U	1.00	U
NB-355-PW	15-18A	40			1.00	U	1.00	U	1.00	U	1.00	U
NB-047-PW	15-18A	42	70		5.00	U	5.00	U	5.00	U	5.00	U
NB-013-PW	15-18A	43	180	140	50.00	U	50.00	U	50.00	U	50.00	U
NB-001-PW	15-18A	43	180	140	1.00	U	1.00	U	1.00	U	1.00	U
NB-014-PW	15-18A	44			25.00	U	25.00	U	25.00	U	25.00	U
NB-002-PW	15-18A	44			1.00	U	1.00	U	1.00	U	1.00	U
NB-356-PW	15-18A	46	110	80	1.00	U	1.00	U	0.87	AJ	1.00	U
NB-310-PW	15-18A	52			1.00	U	1.00	U	1.00	U	0.58	AJ
NB-017D-PW	15-18A	58			5.00	U	5.00	U	5.00	U	5.00	U
NB-017-PW	15-18A	58			5.00	U	5.00	U	5.00	U	5.00	U
NB-018-PW	15-18A	61			5.00	U	5.00	U	5.00	U	0.66	AJ
NB-019S-PW	15-18A	62			5.00	U	5.00	U	5.00	U	0.64	AJ
NB-019-PW	15-18A	62			5.00	U	5.00	U	5.00	U	0.62	AJ
NB-019-PW	15-18A	62			5.00	U	5.00	U	5.00	U	0.62	AJ
NB-021-PW	15-18A	65			5.00	U	5.00	U	5.00	U	5.00	U
NB-001-PW	15-18A	78	64		5.00	U	5.00	U	5.00	U	5.00	U
NB-033-PW	15-18A	96.01			480.00		22.00		1.30		5.00	U
NB-033S-PW	15-18A	96-01			320.00		21.00		1.10		5.00	U
NB-034-PW	15-18A	99			5.00	U	5.00	U	5.00	U	5.00	U
NB-352-PW	15-18A	106			1.00	U	1.00	U	4.60	A	1.00	U
NB-307-PW	15-18A	108	100	70	1.00	U	1.00	U	9.40	A	1.00	U
NB-048-PW	15-18A	108	100	70	5.00	U	0.50	AJ	9.40	A	5.00	U
NB-049-PW	15-18A	109.03			5.00	U	5.00	U	5.00	U	5.00	U
NB-308-PW	15-18A	110	130	105	1.00	U	1.00	U	5.40	A	1.00	U
NB-306-PW	15-18A	112			6.80	A	1.00	U	1.00	U	1.00	U
NB-311-PW	15-18A	112.01	>80		1.00	U	1.00	U	1.00	U	1.00	U
NB-353-PW	15-18A	112.02			1.00	U	1.00	U	1.00	U	1.00	U
NB-003-PW	15-18A	112.03			4.30	A	0.80	AJ	3.00	A	1.00	U
NB-037-PW	15-18A	114	130	100	5.00	U	5.00	U	5.00	U	5.00	U
NB-038-PW	15-18A	116	300-350		5.00	U	5.00	U	3.00	A	5.00	U
NB-302-PW	15-18A	116	300-350		1.00	U	1.00	U	1.00	U	1.00	U

NB-301-PW	15-18A	118	300		1.00	U	0.70	AJ	14.00	A	1.00	U
NB-039-PW	15-18A	119	100		5.00	U	5.00	U	3.40	A	5.00	U
NB-357-PW	15-18A	119	100	60	1.00	U	1.00	U	1.00	U	1.00	U
NB-040-PW	15-18A	121	140	90	5.00	U	5.00	U	5.00	U	5.00	U
NB-042-PW	15-18A	123	105-110	60	5.00	U	5.00	U	5.00	U	5.00	U
NB-041-PW	15-18A	123	80	55	5.00	U	5.00	U	5.00	U	5.00	U
NB-303-PW	15-18A	125			1.00	U	1.00	U	1.00	U	1.00	U
NB-304-PW	15-18A	127	64		0.92	J	1.00	U	1.00	U	1.70	U
NB-044-PW	15-18A	128	140		5.00	U	5.00	U	5.00	U	5.00	U
NB-359-PW	15-18A	132	125	90	0.62	AJ	1.00	U	1.00	U	1.00	U
NB-354-PW	15-18A	138			1.00	U	1.00	U	1.00	U	1.00	U
NB-045-PW	15-18A	142			5.00	U	5.00	U	5.00	U	5.00	U
CRITERIA					5 (1), 0.7 (2)		5 (1), 2.8(2)		7 (1)(2)		0.19 (2)	

NOTES: (1) Primary MCLs or MCLGs; (2) North Carolina GW Standards A-Average value J-Estimated value U-Not detected

TABLE 5-2. MAIN CONTAMINANTS IN THE SHALLOW GW PLUME IN JUNE 1996 AT THE SITE.

STATION	PCE	Q	TCE	Q	CIS-1,2-DCE	Q
UNITS	UG/L		UG/L		UG/L	
NB001TWA(STW)	1	U	1	U	1	U
NBO02TWA(STW)	1	U	1	U	1	U
N8003TWA(STW)	520		13		130	
NBO04TWA(STW)	1	U	1	U	1	U
NBO05TWA(STW)	20		1	U	1	U
NBO06TWA(STW)	2200		49		1100	
NBO07TWA(STW)	1	U	1	U	1	U
NBO08TWA(STW)	100		4	U	2.9	J
NBO09TWA(STW)	1	U	1	U	1	U
NBO10TWA(STW)	1	U	1	U	1	U
CRITERIA	5(1), 0.7(2)		5(1), 2.8(2)		70(1)	

NOTES: (1) Primary MCLs or MCLGs: (2) North Carolina GW Standards: U - Not detected: J - Estimated value

F. Top-of-Bedrock Groundwater Investigation

In July 1996, fifteen temporary monitoring wells were installed to top of bedrock. Subsequent sampling of the temporary wells was used to design a permanent monitoring well system to monitor both the movement of the plume along the top of the bedrock interface and movement of the plume in the bedrock aquifer (Table 5-3).

Eight top of bedrock (MW-6 through MW-13) were installed during the remedial investigation to determine the extent of contamination associated with releases from the former dry cleaners location. Figure 5-6 presents the location of all the monitoring wells.

The permanent monitoring wells were sampled in October/November 1996 and the main contaminants are noted in Table 5-4A and Table 5-4B. The top of bedrock groundwater plume varies from approximately 35 feet to 110 feet below the land surface.

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<IMG SRC 97203K>
<IMG SRC 97203L>

TABLE 5-3. MAIN CONTAMINANTS IN TEMPORARY TOB GW PLUME JULY/AUG 1996 AT THE SITE.

STATION	PCE	Q	TCE	Q	METHYLENE CHLORIDE	Q
UNITS	UG/L		UG/L		UG/L	
SPT1/TOR	1400.0		1	J		NA
TW2	10.0	U	10	U		NA
TW3	460.0	J	19	J	50.0	U
TW3D	560.0	J	24	J	62.0	
TW4	1.0	U	1	U	5.4	
TW5	1.7		1	U	5.0	U
TW5A	1.0	U	1	U	5.0	U
TW6	2.0		1	U	5.0	U
TW7	10.0	U	10	U		NA
TW8	10.0	U	10	U		NA
TW9	5.1		1	U	5.0	U
TW10	3.1		1	U	5.0	U
TW11	1.0	U	1	U	5.0	U
TW12	1.0	U	1	U	5.0	U
TW13	4.2		1	U	5.0	U
TW14	1.0	U	1	U	5.0	U
CRITERIA	5(1) 0.7(2)		5(1) 2.8(2)		5(2)	

TABLE 5-4A. MAIN INORGANIC CONTAMINANTS IN THE PERM TOB GW PLUME OCT 1996 AT THE SITE.

STATION	CD	Q	AL	Q	MN	Q	FE	Q
UNITS	UG/L		UG/L		UG/L		UG/L	
MW2	1	U	160	U	4.0	U	60	U
MW4	1.2	U	62		2.6		500	
MW5	1	U	60	U	1.0	U	20	U
MW6	1.2	U	1100		52.0		1200	
MW7	1.2	U	1300		340.0		1400	
MW8	1.2	U	2700		180.0		1900	
MW9	1.2	U	1600		340.0		2400	
MW10	1.2	U	98		110.0		120	
MW11	7.2		4800		160.0		3400	
MW12	1.2	U	37		130.0		12	U
MW13	1.2	U	38		2.5	U	12	U
CRITERIA	5(1)		50 - 200(2)		50 (2)		300 (2)	

TABLE 5-4B. MAIN ORGANIC CONTAMINANTS IN THE PERM TOB GW PLUME OCT 1996 AT TNE SITE.

STATION	1,1-DCE	Q	cis-1,2-DCE	Q	CLEM	Q	TCE	Q	PCE	Q
MW2	1.0	UR	1.00	U	2.0		1.00	U	2.00	
MW4	1.0	U	1.00	U	1.0	U	1.00	U	1.00	U
MW5	1.0	UR	1.00	U	1.0	U	1.00	U	1.00	U
MW6	50.0	U	76.00		50.0	U	49.00	J	2500.00	
MW7	2.7	A	0.56	J	11.0	U	0.54	AJ	1.00	U
MW8	1.0	U	1.00	U	1.0	U	1.00	U	1.00	J
MW9	1.0	U	1.00	U	1.0	U	1.00	U	14.00	
MW10	5.0	U	6.00	U	5.0	U	5.00	U	80.00	
MW11	1.0	U	1.00	U	1.0	U	1.00	U	1.70	
MW12	1.0	U	1.00	U	1.0	U	1.00	U	37.00	
MW13	12.0		1.00	U	1.0	U	1.00	U	1.00	U
MW13D	9.4		1.00	U	1.0	U	1.00	U	1.00	U
CW1	20.0	U	53.00		20.0	U	16.00	J	630.00	
CW8	1.0	U	1.00	U	1.0	U	1.00	U	1.00	U
CW8D	1.0	U	1.00	U	1.0	U	1.00	U	1.00	U
CRITERIA	7.0(1)(2)		70(1)		0.19(2)		5 (1), 2.8(2)		5 (1), 0.7(2)	

NOTES: (1) Primary MCLs or MCLGs; (2) North Carolina GW Standards, CW-8 had concentrations of Heptachlor Epoxide of 0.0097J which
exceeds North Carolina GW Standard of 0.004.

G. Bedrock Groundwater Investigation

Nine bedrock monitoring wells (MW-14 through MW-22) were installed during the remedial investigation to determine the extent of contamination associated with releases from the former dry cleaners location. The bedrock groundwater plume was evaluated by using data from the permanent monitoring wells installed within the bedrock aquifer as well as the residential drinking water wells in the study area. The main contaminants of the bedrock monitoring wells are noted in Tables 5-5A and B. The contaminant isopleth for PCE was computer modeled using the data from both the permanent bedrock monitoring wells and the residential drinking water wells; as shown in Figures 5-8.

H. Other Constituents In Groundwater

During the investigation of the groundwater plume, additional contaminants were found which characterized a second plume. These contaminants were not found in the original site plume; the top of bedrock aquifer contains 1,1-dichloroethene and the bedrock aquifer contains 1,1-dichloroethene, 1,1,1-trichloroethane and trichlorofluoromethane. These compounds were not noted in the above sections because they did not exceed regulatory guidelines or criteria in the groundwater monitoring wells. Figure 5-9 denotes the concentration of the 1,1-dichloroethene at the respective locations in the top of bedrock monitoring wells. Figures 5-10 and 15-11 denote the concentration of 1,1-dichloroethene and trichlorofluoromethane at the respective locations in the bedrock monitoring wells and the residential wells (1,1,1-trichloroethane was not plotted due to its similarity in concentration with 1,1-dichloroethene).

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I. Ecological Survey

A bioassessment was conducted of the "unnamed tributary-A" located north of the Site. Study objectives were to (1) characterize the benthic macro invertebrate community of the tributary and an established reference stream (Dutchmans Creek) near Mount Holly, N.C., (2) evaluate the quality of the stream habitat sites using the Rapid Bioassessment Methodology (EPA, 1989), and (3) conduct in-situ physicochemical measurements. Completion of these study objectives showed that the stream was not affected by the Site.

The headwaters of the unnamed tributary adjacent to the Site are located less than 1000' northwest of the railrRad crossing at Goshen Grove (see Figure 5-12). The unnamed tributary flows through an urbanized area for approximately one mile and then joins another unnamed tributary prior to its confluence with Fites Creek. Due to their proximity to urban areas, both unnamed tributaries and their floodplains have been subjected to environmental degradation. Past studies by the NCDEHNR, 1974-75 & 1986, found poor water quality due to urban runoff in the unnamed tributary that joins Fites Creek northeast of North Belmont.

TABLE 5-5A. MAIN ORGANIC CONTAMINANTS IN THE BEDROCK GW PLUME, PERM MONITORING WELLS

STATION	cis-1,2-DCE	Q	CLFM	Q	TCE	Q	PCE	Q
UNITS	UG/L		UG/L		UG/L		UG/L	
NB002CW	1.00	U	1.00	U	1.00	U	0.50	J
NB002CWS	1.00	U	1.00	U	1.00	U	0.50	J
NB003CW	13.00		1.00	U	3.00		77.00	
NB003MW	11.00		1.00	U	4.00		69.00	
NB004CW	0.80	J	1.00	U	1.00	U	2.00	
NB005CW	26.00		20.00	U	20.00	U	520.00	
NB006CW	940.00		50.00	U	280.00		3500.00	
NB007CW	9.40		4.00	U	7.40		160.00	
NB009CW	1.00	U	1.00	U	1.00	U	1.00	U
NB014MW	7.10		2.40	J	4.00	U	160.00	
NB015MW	1.00	U	1.00	U	1.00	U	1.00	U
NB016MW	110.00		1.40		30.00		320.00	
NB017MW	1.00	U	1.00	U	1.00	U	1.00	U
NB018MW	1.00	U	1.00	U	1.00	U	1.00	U
NB019MW	1.00	U	1.00	U	1.00	U	4.20	
NB020MW	1.00	U	0.83	J	1.00	U	3.10	
NB021MW	1.00	U	1.00	U	1.00	U	1.00	U
NB022MW	1.00	U	1.00	U	1.00	U	2.00	
NB022MWD	1.00	U	1.00	U	1.00	U	2.00	
CRITERIA	70 (1)		0.19 (2)		5 (1), 2.8 (2)		5 (1), 0.7 (2)	

NOTES (1) RED values exceed Primary MCLs or MCLGs: (2) BLUE values exceed North Carolina GW Standards

TABLE 5-5B. MAIN INORGANIC CONTAMINANTS IN THE BEDROCK GW PLUME, PERM MONITORING WELLS

STATION	CD	Q	PB	Q	ZN	Q	AL	Q	MN	Q	FE	Q
UNITS	UG/L		UG/L		UG/L		UG/L		UG/L		UG/L	
NB002CW	2	U	3.0	U	7400.0		20	U	25.0		30	U
NB002CWS	2	U	2.0	U	7300.0		20	U	23.0		120	
NB003CW	1	U	15.0		180.0		20	U	20.0		1800	
NB003MW	1	U	2.0	U	20.0	U	30	U	8.0	U	40000	U
NB004CW	1	U	3.0	U	48.0		20	U	29.0		540	
NB005CW	1.2	U	5.3		290.0		50	U	280.0		29000	
NB006CW	1.2	U	1.2	U	2.5	U	50	U	2.5	U	12	U
NB007CW	1.2	U	48.0		520.0		67		17.0		1800	
NB009CW	10		280.0		4400.0		92		100.0		21000	
NB014MW	1.2	U	1.2	U	13.0		810		72.0		2700	
NB015MW	1.2	U	1.2	U	2.5	U	260		230.0		7000	
NB016MW	1.2	U	1.2	U	5.2		1300		170.0		5400	
NB017MW	1.2	U	1.2		18.0		5300		110.0		5800	
NB018MW	1.2	U	1.2	U	8.2		150		180.0		16000	
NB020MW	1.2	U	1.2	U	27.0		160		43.0		1600	
NB021MW	1.2	U	1.2	U	2.5	U	51		12.0		880	
NB022MW	1.2	U	1.2	U	5.7		120		260.0		18000	
NB022MW	1.2	U	1.2	U	7.7		170		260.0		19000	
CRITERIA	5 (1) (2)		15 (2)		2100 (2), 5000 (3)		50 - 200 (2)		50 (2) (3)		300 (2) (3)	

NOTES: (1) RED Values exceed Primary MCLs or MCLGs; (2) BLUE values exposed North Carolina GW Standards;
(3) GREEN Values exceed Secondary MCLs

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Sampling stations in the unnamed tributary adjacent to the Site were located near the headwaters at the railroad crossing (UT-1), proximal to the Site (UT-11A), and downstream of the Site at the railroad crossing and just before the confluence with the unnamed tributary to Fites Creek. NCDEHNR indicated a suitable reference site, Dutchmans Creek, existed near Mount Holly, N.C. Reference sites are minimally impacted sites and serve to provide insight into biological potential for an area and allow comparison to other sites to determine if impacts exist and the severity of those impacts. Dutchmans Creek was sampled at SR 1918 (Sandy Ford Road) north of Mount Holly.

The Rapid Bioassessment III of the unnamed tributary adjacent to the Site (stations UT-1, UT-1A, and UT-2) and Dutchmans Creek resulted in these findings:

- Benthic macroinvertebrate collections from the unnamed tributary (UT) indicate that the creek is impaired. Pollution-tolerant species of benthic macroinvertebrates, primarily midges and flies (Diptera) were predominant numerically in both taxa (species) and individuals (density).

- Benthic macroinvertebrate collections from the reference station, Dutchmans Creek (DC-1), were diverse with a total of 35 species classified. Pollution sensitive species of benthic macro invertebrates (Ephemeroptera, Plecoptera, and Trichoptera = EPT) were more prevalent at DC-1 from both a numerical density and taxa richness perspective. No impairment is indicated for DC-1.

- Habitat degradation was evident at all the unnamed tributary stations. Lack of habitat diversity, siltation/sedimentation, and the absence of riffle/runs all contributed to low habitat evaluation scores. This was an obvious factor affecting the benthic macroinvertebrates at the unnamed tributary since the biological potential of a site is largely determined by the quality of the habitat at that site. Quality of the habitat at all the unnamed tributary sites could only be classified as fair. Habitat evaluation scores ranged from 56-67.

- The reference station, DC-1, had a habitat evaluation score of 100 which falls into the classification of "good" based on the habitat assessment form. Some sedimentation effects prohibited DC-1 from having a habitat evaluation score in the "excellent" range (104-135). Habitat diversity, coupled with no serious habitat degradation, led to a diverse benthic macroinvertebrate fauna at DC-1.

- In-situ physicochemical measurements at the unnamed tributary (UT) and Dutchmans Creek (DC-1) revealed no violations of state water quality standards. Dissolved oxygen, pH, and water temperature were similar in range in both creek systems. Conductivity values were higher at the unnamed tributary possibly due to the effects of urban drainage.

<IMG SRC 97203O>
<IMG SRC 97203P>
<IMG SRC 97203Q>
<IMG SRC 97203R>

Due to the unnamed tributary's location in a highly urbanized area, it is difficult, without extensive and intensive study efforts, to ascertain what effect the Site has on impairment of the benthic macroinvertebrate community. For example, both urban and Site effects could be impacting the biology of the unnamed tributary.

6.0 SUMMARY OF SITE RISKS

The North Belmont Site is releasing contaminants into the environment. The Baseline Risk Assessment Report presents the results of a comprehensive task assessment that addresses the potential threats to public health and the environment posed by the Site under current and future conditions, assuming that no remedial actions take place, and that the surrounding area will remain a residential community.

The Baseline Risk Assessment Report consists of the following sections: identification of chemicals of potential concern; toxicity assessment; human exposure assessment, and risk characterization. All sections are summarized below.

A. Chemicals of Potential Concern

Data collected during the RI were reviewed and evaluated to determine the chemicals of potential concern at the Site which are most likely to pose risks to the public health. These contaminants were chosen for each environmental media sampled.

The chemicals of potential concern in groundwater are: 1,1-dichloroethene, cis-1,2-dichloroethene, 1,4-dichlorobenzene trichloroethene, trichlorofluoromethane, tetrachloroethene, methylene chloride, chloroform, bis(2-ethyl hexyl) phthalate, alpha chlordane, gamma chlordane, heptachlor epoxide, aluminum, cadmium, chromium, lead, manganese, and zinc.

The chemicals of potential concern in soil are benzo(a)pyrene, benzo(bk) fluoranthene, benzo(a)anthracene, dibenzo(a,h) anthracene, indeno(1,2,3-cd) pyrene, aluminum, chromium, manganese, and vanadium.

Once these chemicals of potential concern were identified, exposure concentrations in each media were estimated. Exposure point concentrations were calculated for surface soils using the lesser of the 95 percent upper confidence limit (UCL) concentration or the maximum detected value as the reasonable maximum exposure (RME) point concentration. For evaluation of groundwater, an alternative approach, often used to assess potential future exposures from wells that might be installed in an area of contaminated groundwater, is to select several different wells from the approximate center of the groundwater plume, and to average these values to derive an estimate of concentration values which might reasonably be expected under worst-case conditions. At this Site, the highest concentrations of PCE and TCE occur in wells SPT1, MW6, CW6, and TW6. Therefore, these wells were chosen to represent the center of the plume. In accordance with Region IV guidance, the mean concentration (rather than the UCL or maximum concentration) is used in this case. Exposure point concentrations are shown for groundwater in Table 6-1 and for soil in Table 6-2.

TABLE 6-1
EXPOSURE POINT CONCENTRATIONS FOR GROUNDWATER
(UG/L)

CHEMICAL OF POTENTIAL CONCERN	Designated Center Plume Wells 1				MEAN
	MW-6	CW-6	TW-6	SPT-1	
Volatiles					
1,1-Dichloroethene	50 U	50 U			25.0
cis-1,2-Dichloroethene	76	940	1100	10 J	531.5
1,4-Dichlorobenzene	50 U	20 U			17.5
Trichloroethene	49 J	280	49	1 J	94.8
Trichlorofluoromethane	50 U	50 U			25.0
Tetrachloroethene	2500	3500	2200	1400	2400.0
Methylene Chloride	ND	ND	ND	ND	
Chloroform	50 U	50 U			25.0
Semivolatiles					
Bis(2-ethylhexyl)phthalate	110	28			69.0
Pesticides					
alpha Chlordane	0.25 U	0.25 U			0.13
gamma Chlordane	0.25 U	0.25 U			0.13
Heptachlor epoxide	0.1 U	0.1 U			0.05
Inorganics					
Aluminum	1100	50 U			562.5
Cadmium	1.2 U	1.2 U			0.60
Chromium	14	2.5 U			7.6
Lead	1.2 U	1.2 U			0.60
Manganese	52	2.5 U			26.6
Zinc	250	2.5 U			125.6

1 Exposure point concentrations for groundwater are based on data from wells in the center of the plume. Data that was nondetect (i.e. 50 U) were assumed to be present at 1/2 the detection limit. As a result, data with "U" qualifiers were multiplied by 0.5 before the mean was calculated.
ug/l - micrograms per liter
J = Estimated value
ND - Not detected

TABLE 6-2
EXPOSURE POINT CONCENTRATIONS FOR SOIL

Chemical of Potential Concern	Mean of Logtransformed Data	Standard Deviation of Logtransformed Data	N(1)	H Statistic	Maximum Concentration (mg/kg)	95% UCL(2)	Exposure Point Concentration (mg/kg)(3)
Semivolatiles							
Benzo(a)anthracene	-1.16	0.91	6	4.478	2.0	2.9	2.0 (max)
Benzo(bk)fluoranthene	-1.18	1.17	6	6.001	3.2	14	3.2 (max)
Benzo(a)pyrene	-1.16	0.91	6	4.478	2.0	2.9	2.0 (max)
Indeno(1,2,3-cd)pyrene	-1.33	0.94	6	4.478	1.6	2.7	1.6 (max)
Dibenzo(a,h)anthracene	-1.35	0.43	6	2.947	0.62	0.50	0.62 (UCL)
Inorganics							
Aluminum	9.8	0.36	6	2.651	29000	29363	29000(max)
Chromium	3.20	1.03	6	4.905	80	397	80(max)
Manganese	5.59	1.04	6	4.905	1800	4518	1800(max)
Vanadium	5.43	0.58	6	3.287	450	632	450(max)

(1) Number of Samples

(2) 95% Upper Confidence Limit

(3) The 95% UCL of the mean concentration represents the exposure point concentration for a chemical unless it exceeded the maximum detected concentration. Where the maximum detected concentration was exceeded, the maximum detected concentration was used as the exposure point concentration.

mg/kg = milligrams per kilogram

B. Exposure Assessment

The exposure assessment evaluates and identifies complete pathways of exposure to human population on or near the Site. Current exposure pathways include exposure through incidental ingestion of soil; inhalation of fugitive dusts from soils; dermal contact with soils; and ingestion of water from private wells. Land use assumptions include residential and commercial.

Future use scenarios consider construction of a water supply well within the groundwater contaminant plume and ingestion of soil, inhalation of dusts and dermal contact with soils as a worse-case scenario. Possible exposure pathways for groundwater include exposure to contaminants of concern from the groundwater plume in drinking water and through inhalation of volatiles evolved from water through household water use. Further detail and mathematical calculations can be reviewed in the Baseline Risk Assessment.

C. Toxicity Assessment

Under current EPA guidelines, the likelihood of adverse effects occurring in humans from carcinogens and noncarcinogens are considered separately. These are discussed below. Tables 6-3 and 6-4 summarize the carcinogenic and noncarcinogenic toxicity criteria for the chemicals of potential concern.

EPA uses a weight-of-evidence system to classify a chemical's potential to cause cancer in humans. All regulated chemicals fall into one of the following categories: Class A - Known Human Carcinogen; Class B - Probable Human Carcinogen; Class C - Possible Human Carcinogen, Class D - Not classifiable as to human carcinogenicity; and Class E - Evidence of Noncarcinogenicity in humans.

Cancer slope factors have been developed by EPA for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. Slope factors, which are expressed in units of kg-day/mg, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upperbound" reflects the conservative estimate of the risks calculated from the slope factor. Use of this approach makes underestimation of the actual cancer risk highly unlikely.

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals; that are free of any adverse effects.

TABLE 6-3 CARCINOGENIC TOXICITY DATA

Chemical	Weight of Evidence	Oral Slope Factor (mg/kg day)	Tumor Type	Animal Species	Reference	Inhalation Slope Factor (mg/kg/day)	Tumor Type	Animal Species	Reference	Dermal Slope Factor b
Volatiles										
Chloroform	B2	6.10E-03	Kidney tumors	Rat	IRIS	8.10 E-02	Liver carcinomas	Mouse	IRIS	7.63E-03
1,4-Dichlorobenzene	C	2.4E-02	Liver tumors	Mouse	HEAST	NTV	--	--	--	3.00E-02
1,1-Dichlorethene	C	6.00E-01	Adrenal phenchromocytomas	Rat	IRIS	1.8E-01	Kidney adrenocarcinoma	Mouse	IRIS	7.50E-01
cis-1,2-dichloroethene	NC	--	--	--	--	--	--	--	--	--
Methylene chloride	B2	7.5E-03	Hematocellular adenomas	Mouse	IRIS	1.64E-03	Adenomas and carcinomas	Mouse	IRIS	9.38E-03
Tetrachloroethane	C-B2	5.2E-02	NA	NA	NCEA	2.00E-03	NA	NA	NCEA	6.5E-02
Trichloroethene	B2	1.10E-02	NA	NA	NCEA	6.00E-03	NA	NA	NCEA	1.38E-02
Trichlorofluoromethane	NC	--	--	--	--	--	--	--	--	
Semivolatiles										
Benzo(a)pyrene	B2	7.30E+00	Forestomach (c)	Mouse	IRIS	3.10E+00	NA	NA	NCEA	1.49E+01
Benzo(b,k)fluoranthene	B2	7.30E-01	Forestomach (c)	Mouse	IRIS, EPA IV	3.10E-01	NA	NA	NCEA, EPA IV	1.46E+00
Benzo(a)anthracene	B2	7.30E-01	Forestomach (c)	Mouse	IRIS, EPA IV	3.10E-01	NA	NA	NCEA, EPA IV	1.46E+00
Bis(2-ethylhexyl)phthalate	B2	1.40E-02	Liver carcinoma	Mouse	IRIS	NTV	--	--	--	2.80E-02
Dibenzo(a,h)anthracene	B2	7.30E-00	Forestomach (c)	Mouse	IRIS, EPA IV	3.10E+00	NA	NA	NCEA, EPA IV	1.46E+01
Indeno(1,2,3-cd)pyrene	B2	7.30-01	Forestomach (c)	Mouse	IRIS, EPA IV	3.10E-01	NA	NA	NCEA, EPA IV	1.46E-00
Pesticides										
Chlordane	B2	1.30E+00	Liver carcinomas	Mouse	IRIS	1.30E+00	Liver carcinomas	Mouse	IRIS	2.60E+00
Heptachlor Epoxide	B2	9.10E+00	Liver carcinomas	Mouse	IRIS	9.1E+00	Liver carcinomas	Mouse	IRIS	1.82E+01
Inorganics										
Aluminum	NC	--	--	--	--	--	--	--	--	--
Cadmium	B1	NTV	--	--	IRIS	6.3E+00	Lung, trachea	Human	IRIS	--
Chromium III	NC	--	--	--	--	--	--	--	--	--
Chromium VI	A	NTV	--	--	IRIS	4.2E+01	Lung cancer	Human	IRIS	--
Lead	B2	NTV	--	--	IRIS	NTV	--	--	IRIS	--
Manganese	NC	--	--	--	--	--	--	--	--	--
Vanadium	NC	--	--	--	--	--	--	--	--	--
Zinc	NC	--	--	--	--	--	--	--	--	--

a = EPA IV - Region IV Supplemental Guidance to RAGS, 1995; IRIS - Integrated Risk Information System (IRIS, 1997), HEAST - Health Effects Assessment Summary Tables (EPA, 1995); NCEA National Center for Environmental Assessment (EPA, 1997)
b = Dermal Slope Factor = Oral Slope Factor/Oral Absorption Factor
c = Forestomach squamous cell papillomas and carconomas
NA - Not available, NC - Not classified as a carcinogen; NTV -- No Toxicity value available

TABLE 6-4 NONCARCINOGENIC TOXICITY DATA

Chemical	Oral RfD mg/kg/day)	Confidence Level	Toxicity Endpoint	UF/MF	Reference	Inhalation RfD (mg/kg/day)	Toxicity Endpoint	UF/MF	Reference*	Dermal RfD
Volatiles										
Chloroform	1.00E-02	Medium	Fatty cyst formation in liver	1000/1	--	NTV	--	--	--	8.00E-03
1,4-Dichlorobenzene	NTV	--	--	--	IRIS	2.29E-01	Increased liver weight	100/1	IRIS	--
1,1-Dichloroethene	9.00E-02	Medium	Liver lesions	1000/1	--	NTV	--	--	--	7.20E-03
cis-1,2-dichloroethene	1.00E-02	NA	Decreased blood hematocrit/hemoglobin	3000	--	NTV	--	--	--	8.00E-03
Methylene chloride	6.00E-02	High	Liver toxicity	100/1	HEAST	8.60E-01	Liver toxicity	100	HEAST	4.8E-02
Tetrachloroethene	1.00E-02	Low	Liver toxicity; weight loss	1000/1	IRIS	NTV	--	--	--	8.00E-03
Trichloroethene	6.00E-03	NA	NA	NA	NCEA	NTV	--	--	--	4.80E-03
Trichlorofluoromethane	3.00E-01	Medium	Decreased survival; histopathy	1000/1	IRIS	2.00E-01	Incresased kidney burn; lung inflamation	10000	HEAST	--
Semivolatiles										
Benzo(a)pyrene	NTV	--	--	--	--	NTV	--	--	--	--
Benzo(a,b,k)fluoranthene	NTV	--	--	--	--	NTV	--	--	--	--
Bis(2-ethylhexyl)phthalate	2.00E-02	Medium	Increased relative liver weight	1000/1	IRIS	NTV	--	--	--	1.00E-02
Dibenzo(a,h)anthracene	NTV	--	--	--	--	NTV	--	--	--	--
Indeno(1,2,3-cd)pyrene	NTV	--	--	--	--	NTV	--	--	--	--
Pesticides										
Chlordane	6.00E-05	Medium	Liver hypertrophy	1000/1	IRIS	NTV	--	--	--	3.00E-05
Haptachlor Epoxide	1.30E-05	Low	Increased relative liver weight	1000/1	IRIS	NTV	--	--	--	6.50E-06
Inorganics										
Aluminum	1.00E+00	NA	NA	NA		NTV	--	--	--	--
Cadmium(food/soil)	1.00E-03	NA	Proteinurla	10/1	IRIS	NTV	--	--	--	2.00E-04
Cadmium(water)	5.00E-04	NA	Proteinurla	10/1	IRIS	NTV	--	--	--	--
Chromium III	1.0E+00	Low	No effects observed	100/10	IRIS	NTV	--	--	--	2.00E-01
Chromium VI	5.0E-03	Low	No effects observed	500/1	IRIS	NTV	--	--	--	1.00E-03
Lead	NTV	--	--	--	--	NTV	--	--	--	NA
Manganese (food)	1.4E-01	Medium	CNS effects	1/1	IRIS	NTV	--	--	--	NA
Manganese (nondietary)	4.70E-02	Medium	CNS effects	1/1	IRIS	1.4E-05	Impairment of neurobehavioral	1000/1	IRIS	9.4E-03
Vanedium	7.00E-03	NA	No Information	100	HEAST	NTV	--	--	--	1.43E-03
Zinc	3.00E-01	Medium	Deceased blood enzyme	3/1	IRIS	NTV	--	--	--	6.00E-02

IRIS - Integrated Risk Information System (IRIS, 1997); HEAST - Health Effects Assessment Summary Tables (EPA, 1995); NCEA - National Center for Environmental Assessment (EPA, 1997).
b = Dermal Slope Factor = Oral Slope Factor/Oral Absorption Factor
NA - Not available; NC - Not classified as a carcinogen; NTV--No toxicity value available

Estimated intakes of chemicals from environmental media can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied. These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

D. Risk Characterization

The risk characterization integrates the toxicity and exposure assessments into quantitative and qualitative expressions of risk. The output of this process is a characterization of the Site related potential noncarcinogenic and carcinogenic health effects.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HO), or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's RfD. By adding the HQs for all contaminants within a medium or across all media to which a given population may be reasonably exposed, the Hazard Index (HI) can be generated. Calculation of a HI in excess of unity indicates the potential for adverse health effects. Indices greater than one will be generated anytime intake for any of the chemicals of concern exceeds its RfD. Rowever, given a sufficient number of chemicals under consideration, it is also possible to generate a HI greater than one even if none of the individual chemical intakes exceeds their respective RfDs.

Carcinogenic risk is expressed as a probability of developing cancer as a result of lifetime exposure. Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor. EPA's acceptable target range for carcinogenic risk is one-in-ten-thousand (1E-4) to one-in-one-million (1E-6).

Cancer and noncancer risks for the current and future use scenarios for the Site are summarized in Table 6-5.

SOIL

As shown in this table, the screening-level Reasonable Maximum Exposure (RME) Hazard Index for soil is below a level of concern for adults (HI = 0.22), but is slightly above levels of concern for children (HI = 1.8). This value is due to contributions from aluminum, chromium, manganese, and vanadium. Because none of these chemicals cause noncancer effects on the same target tissues, and because none of the chemical-specific HQ values exceed a value of one, it is concluded that exposure to soil is not likely to pose a significant noncancer risk to children.

TABLE 6-5
SUMMARY OF HAZARD INDICES AND CARCINOGENIC RISKS
REASONABLE MAXIMUM EXPOSURE SCENARIO

SCENARIO	TOTAL HAZARD INDEX	TOTAL CANCER RISK
Risks From Soil		
Current/Future Child Resident 1	1.80	3.1E-05
Current/Future Adult Resident 1	0.22	2.0E-05
Combined Current/Future Child and Adult Resident	--	5.1E-05
Risks From Groundwater 2		
Future Child Resident	20.89	7.8E-04
Future Adult Resident	8.96	1.5E-03
Combined Future Child and Adult Resident	--	2.2E-03
Combined Risks From Soil and Groundwater		
Future Child Resident	22.69	8.1E-04
Future Adult Resident	9.17	1.5E-03
Combined Future Child and Adult Resident	--	2.3E-03

1 Risks from soil are the same for the current and future child and adult residents.
2 Risks from groundwater are based on data from the center of the tetrachloroethene (PCE) and trichloroethene (TCE) groundwater plume.

Estimated RME excess cancer risks from soil to residents (child plus adult) are 5E-05. This risk is due entirely to the presence of polyaromatic hydrocarbons (PAHs) in soil, especially benzo(a)pyrene. The risk is contributed about equally by ingestion exposure and dermal contact. These risk levels are within the range (1E-04 to 1E-06) that are generally considered to be acceptable by EPA.

GROUNDWATER

The screening level RME Hazard Index would be in a range of concern for both children (HI=20.89) and adults (HI=8.96) if water from the center of the plume were used for drinking and showering. This risk is primarily due to PCE, with a smaller but still significant contribution from cis-1,2-DCE. Other chemicals in the center of the plume do not have HQ values that exceed one, and do not appear to pose significant noncancer risk.

Estimated RME excess cancer risk to residents (child plus adult) from water at the center of the plume is 2.2E-03, substantially above the usual accepeptable risk range of 1E-04 to 1E-06. This estimated excess cancer risk is due primarily to PCE (1.9E-03), with a smaller but still significant contribution (2.6E-04) from 1,1-DCE. These risks are derived mainly from the ingestion rote (2.1E-03), with a relatively small contribution due to inhalation of volatiles while showering (1.1E-04). Other chemicals which contribute RME risks greater than 1E-06 include chloroform, TCE, bis (2-ethylhexyl)phthalate, heptachlor epoxide, and 1,4-dichloro benzene. The combined RME risks from all of these chemicals is 6.9E-05.

The quantified carcinogenic risk for each chemical of concern is given in Table 6-6.

LEAD

Lead concentration data are available for 31 groundwater wells. Most of these wells (24 out of 31) had lead levels at or below detection limits (<3 ug/l), and 29 of 31 had concentrations at or below the current EPA action level for lead in drinking water (15 ug/1). Only two wells(converted wells NB007 and NB009) had concentrations above the action level, with measured values of 48 and 280ug/l, respectively. Based on the groundwater data, it seems likely that most wells will be associated with lead levels that are not in a range of concern.

E. Conclusions

Actual or threatened releases of hazardous substances from this Site if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

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TABLE 6-7 cont. SUMMARY OF CHEMICALS AND EXPOSURE ROUTES EXCEEDENCE A HAZARD INDEX OF 1; REASONABLE MAXIMUM EXPOSURE SCENARIO

SCENARIO	RECEPTOR	CHEMICALS EXCEEDING A HAZARD INDEX OF 1 AND THEIR PERCENT CONTRIBUTION			EXPOSURE ROUTES EXCEEDING A HAZARD INDEX OF 1 (TOTAL RISK FROM ALL CHEMICALS) AND THEIR PERCENT CONTRIBUTION		
		CHEMICAL	HAZARD INDEX	PERCENT	EXPOSURE ROUTE	HAZARDINDEX	PERCENT
Current/Future Risks From Soil	Child Resident	No chemicals exceeded a hazard index of 1			Incidental Injestion of Surface Soil	1.7	96.0%
	Adult Resident	No chemicals exceeded a hazard index of 1			No exposure routes exceeded a hazard index of 1		
Future Risks From Groundwater	Child Resident	Tetrachloroethene	15.3	73.4%	Ingestion of Groundwater	20.9	100.0%
		cis-1,2-Dichloroethene	3.4	16.3%	Note: Noningestion Use was not evaluated for the child resident		
		Trichloroethene	1.0	4.8%			
	Adult Resident	Tetrachloroethene	6.6	73.4%	Ingestion of Groundwater	9.0	99.8%
		cis-1,2-Dichloroethene	1.5	16.3%			
Combined Future Risk From Soil and Groundwater (Center Plume Wells)	Child Resident	Tetrachlorcethene	15.3	67.6%	Ingestion of Groundwater	20.9	92.1%
		cis-1,2-Dichloroethene	3.4	15.0%			
		Trichloroethene	1.0	4.5%			
	Adult Resident	Tetrachloroetheme	6.6	71.7%	Ingestion of Groundwater	9.0	97.6%
		cis-1,2-Dichloroethene	1.5	15.9%			

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SECTION 7. APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

The requirement that ARARs be identified and complied with and the development and implementation of remedial actions is found in Section 121(d)(2) of CERCLA, 42 U.S.C. Section 9621 (d)(2). This section requires that for any hazardous substance remaining on-site, all federal and state environmental and facility citing standards, requirements, criteria, or limitations shall be met at the completion of the remedial action to the degree that those requirements are legally applicable or appropriate and relevant under the circumstances presented at the Site.

Three classifications of requirements are defined by EPA in the ARAR determination process:

- Chemical-specific: These requirements set protective remediation levels for the chemicals of concern.

- Location-specific: These requirements restrict remedial actions based on the characteristics of the tite or its immediate surroundings.

- Action-specific: These requirements set controls or restrictions on the design, implementation, and performance levels of activities related to the management of hazardous substances, pollutants, or contaminants.

A. Chemical-Specific ARARs

Chemical-specific ARARs include those laws and regulations governing the release of materials possessing certain chemical or physical characteristics, or containing specified chemical compounds. Chemical-specific requirements set health- or risk-based concentration limits or ranges in various environmental media for specific hazardous substances, contaminants, and pollutants. These ARARs, when applied to site-specific conditions, establish numerical values that define the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment. Examples include drinking water standards and ambient air quality standards. Chemical-specific ARARs are established once the nature of the contamination at the site has been defined, which is accomplished during the RI. Chemical-specific ARARs for this Site are listed in Table 7-1.

TABLE 7-1-CHEMICAL-SPECIFIC ARARS, CRITERIA, AND GUIDANCE FOR THE SITE

STANDARD, REQUIREMENT, CRITERIA, OR LIMITATION	CITATION	REQUIREMENTS SYNOPSIS	COMMENT
FEDERAL			
Safe Drinking Water Act	40 USC Section 300		
National Primary Drinking Water Standards	40 CFR Part 141	Establishes health-based standards for public water systems (MCLs).	The MCLs for organic and inorganic contaminants are relevant and appropriate to the groundwater contaminated by the site since the aquifer is a drinking water source.
National Secondary Drinking Water Standards	40 CFR 143	Establishes welfare-based standards for public water systems (secondary MCLs).	Secondary MCLs for organic and inorganic contaminants are guidelines to be considered for groundwater since it is a drinking water source.
Maximum Contamination Level (MCL) Goals	40 CFR 141	Establishes drinking water quality goals set at levels of no known or anticipated adverse health effects.	MCLGs for organic and inorganic contaminants are relevant and appropriate to the groundwater since it is a drinking water source.
Clean Water Act	33 USC Section 1251-1376		
Water Quality Criteria	40 CFR Part 131	Sets criteria for water quality based on toxicity to aquatic organisms and human health.	May be relevant and appropriate if groundwater, either treated or untreated, is discharged to a surface water body. Also relevant and appropriate to any runoff from contaminated soil or soil remediation activities.
Resource Conservation and Recovery Act (RCRA), as amended	42 USC 6905 6912, 6924, 6925		
RCRA Groundwater Protection	40 CFR Part 264	Provides for groundwater protection standards, general monitoring requirements, and technical requirements.	RCRA groundwater protection standards are relevant and appropriate for groundwater at the site.
Clean Air Act	40 USC 1857		
National Primary and Secondary Ambient Air Quality Standards	40 CFA Part 50	Sets primary and secondary, air standards at levels to protect public health and public welfare.	May be relevant and appropriate if onsite treatment units or excavation are a part of remedial action.
National Emissions Standards for Hazardous Air Pollutants (NESHAPs)	40 CFR Part 61	Provides emissions standard for hazardous air pollutants for which no ambient air quality standard exists.	May be relevant and appropriate if onsite treatment units or excavation are a part of remedial action.
STATE			
North Carolina Drinking Water Act	130A NCAC 311-327	Regulates water systems within the state that supply drinking water that may affect the public health.	Provides the state with the authority needed to assume primary enforcement responsibility under the federal act.
North Carolina Groundwater Standards	15A NCAC 2L	Establishes groundwater classification and water quality standards.	Guidelines for allowable levels of toxic organic and inorganic compounds in groundwater used for drinking water. Relevant and appropriate to groundwater at the Site.
North Carolina Water Quality Standards	15A NCAC 2B	Establishes a series of classifications and water quality standards for surface water.	May be applicable if treated groundwater is discharged to surface waters.
North Carolina Surface Water Effluent Limitations	15A NCAC 2B	Establishes limits and guidelines for effluent discharged to waters of the state.	May be applicable if treated groundwater is discharged to surface water.
North Carolina Air Pollution Control Regulations	15A NCAC 2D/2Q	Regulates ambient air quality and establishes air quality standards for hazardous air pollutants.	May be applicable is on-site treatment or excavation is part of the remedial action.
North Carolina Hazardous Waste Management Rules	15A NCAC 13A	Establishes standards for hazardous waste treatment facilities.	May be applicable if hazardous waste is excavated and stored or treated as part of the remedial action.

B. Location-Specific ARARs

Location-specific ARARs are design requirements or activity restrictions based on the geographical or physical positions of the Site and its surrounding area. Location-specific requirements set restrictions on the types of remedial activities that can be performed based on site-specific characteristics or location. Examples include areas in a flood plain, a wetland, or a historic site. Location-specific criteria are generally established early in the RI/FS process since they are not affected by the type of contaminant or the type of remedial action implemented. Location-specific ARARs for this Site are listed in Table 7-2.

C. Action-Specific ARARS

Action-specific ARARs are tech n ology-based, establishing performance, design, or other similar action-specific controls or regulations for activities related to the management of hazardous substances or pollutants. Action-specific requirements are triggered by the particular remedial alternatives that are selected to accomplish the cleanup of hazardous wastes. Action-specific ARARs for this Site are provided in Table 7-3.

D. Media of Concern

Based on the results of the remedial investigation and the baseline risk assessment, the North Belmont Site has one contaminated media; groundwater.

TABLE 7-2 - LOCATION-SPECIFIC ARARS, CRITERIA, AND GUIDANCE

Standard, Requirement, Criteria, or Limitation	Citation	Requirements Synopsis	Comment
Federal			
Resource Conservation and Recovery Act (RCRA), as amended	42 USC 6901		
RCRA Location Standards	40 CFR 264.18(b)	A treatment/storage/ disposal (TSD) facility must be designed, constructed, operated, and maintained to avoid washout on a 100-year floodplain.	May be relevant and appropriated an onsite TSD facility is required as part of overall remediation and it exists within the 100-year floodplain.
Fish and Wildlife Conservation Act	16 USC 2901 et seq.	Requires states to identify significant habitats and develop conservation plans for these areas.	Confirmation with the responsible state agency regarding the Site being located in one of these significant habitats
Floodplain Management Executive Order	Executive Order 11988; 40 CFR 6.302	Actions that are to occur in floodplain should avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial value.	Remedial actions are to prevent incursion of contaminated groundwater onto forested floodplain.
Endangered Species Act	16 USC 1531	Requires action to conserve endangered species or threatened species, including consultation with the Dept of Interior.	Endangered species thus far, have not been identified at the Site.
Wetlands Management Executive Order	Executive Order 11990; 40 CFR 6.302	Action to minimize the destruction, loss or degradation of wetlands.	Relevant and appropriate if remediation occurs in wetlands.

State

North Carolina Hazardous Waste Management Rules	15A NCAC 13A	Location requirements for hazardous waste treatment/storage/ disposal facilities.	May be applicable to hazardous waste excavated, stored, and treated on-site.
North Carolina Solid Waste Management Rules	15A NCAC 13B	Siting requirements for solid waste disposal units.	May be relevant and appropriate to nonhazardous waste disposed on-site.

TABLE 7-3 - ACTION-SPECIFIC ARARS, CRITERIA, AND GUIDANCE FOR THE SITE

STANDARD, REQUIREMENT, CRITERIA, OR LIMITATION	CITATION	REQUIREMENTS SYNOPSIS	COMMENT
FEDERAL			
Groundwater Extraction and Treatment			
Resource Conservation and Recovery Act (RCRA), as amended	42 USC Section 6901 et. seq.		
Identification of Hazardous Waste	40 CFR 261	Federal requirements for classification and identification of hazardous wastes.	Relevant and Appropriate
Treatment of Hazardous Wastes in a Unit	40 CFR 264.601 40 CFR 265.400	Rules and requirements for the treatment of hazardous wastes.	Relevant and Appropriate
Requirements for Generation, Storage, Transportation, and Disposal of Hazardous Waste	40 CFR 263 40 CFR 264	Regulates storage, transportation, and operation of hazardous waste generators.	Relevant and Appropriate
Land Disposal Restrictions	40 CFR 268	Prohibits dilution as a substitute for treatment.	Relevant and Appropriate
Disposal - Discharge to Surface Water/POTW			
Clean Water Act	33 USC Section 1351-1376		
Requires use of Best Available Treatment Technology	40 CFR 122	Use of best available technology economically achievable is required to control discharge of toxic pollutants to Publicly owned treatment works (POTW)	Relevant and Appropriate
Requires Use of Best Management Practices	40 CFR 125	Requries development and implementation of a Best Management Practices program to prevent the release of toxic constituents to surface water.	Relevant and Appropriate
National Pollutant Discharge Elimination System (NPDES) Permit Regulations	40 CFR 122 Subpart C	Use of best available technology economically achievable for toxic pollutants dscharged to surface waters.	Relevant and Appropriate
Discharge must be consistent with the requirements of a Water Quality Management Plan approved by EPA	40 CFR 122	Discharge must comply with EPA-approved Water Quality Management Plan.	Relevant and Appropriate
Discharge must not increase contaminant concentrations in offsite surface water.	Section 121 (d)(2)(B)(III)	Selected remedial action must establish a standard of control to maintain surface water quality.	Relevant and Appropriate
Other			
Occupational Safety and Health Administration	29 CFR 1910 Part 120	Provides safety rules for handling specific chemicals for site workers during remedial activities.	Applicable
STATE			
North Carolina Water Quality Standards	15A NCAC 2B	Surface wafer quality standards.	Relevant and Appropriate
North Carolina Groundwater Standards	15A NCAC 2L	Establishes groundwater standards, regulates injection wells, sets criteria for natural attenuation.	Relevant and Appropriate
Wastewater Discharge to Surface Waters	15A NCAC 2H	Regulates surface water discharge and discharges to POTW.	Relevant and Appropriate
North Carolina Air Pollution Control Regulations	15A NCAC 2D and 2Q	Regulates ambient air quality and establishes air quality standards for hazardous air pollutants.	May be applicable for on-site treatment/excavation.

SECTION 8. REMEDIAL ACTION OBJECTIVES

Considering the requirements for risk reduction and the risk-based remediation levels derived in the Baseline Risk Assessment, and the ARARs discussed previously, the remediation goals specifically developed for groundwater across the entire Site are presented in Table 8-1.

The remediation goals were selected as the most conservative of the chemical specific ARARs or the health-based risk goals. The contract required quantitation limit (CRQL) was chosen if the chemical-specific ARAR was below this limit. The background concentration would have been selected as the remediation goal if it had exceeded the risk-based goal, as is the normal procedure.

TABLE 8-1 - REMEDIATION GOALS FOR GROUNDWATER AT THE NORTH BELMONT SITE

CONTAMINANTS OF CONCERN	MAX (UG/L)	REMEDIATION GOAL (UG/L)	BASIS
Tetrachloroethene (PCE)	3,500	1	CRQL (NCGS 0.7 ug/l)
Trichloroethene (TCE)	280	2.8	NC 2L GS
Cis-1,2-Dichloroethene (1,2-DCE)	1,100	70	NC 2L GS
Chloroform (CLFM)	2.4	1	CROL (NC 2L GS - 0.19 ug/l)
Methylene Chloride	62	5	NC 2L GS
1,1-Dichloroathene (1,1-DCE)	14	7	NC 2L GS
Bis(2-ethylhexyl)phthalate	110	3	NC 2L GS
Lead	280	15	NC 2L GS

Notes: CRQL - Contract Required Quantitation Limit; NC 2L GS - North Carolina Administrative Code Subchapter 2L
Groundwater Standard

SECTION 9. DESCRIPTION OF ALTERNATIVES

Table 9-1 lists the remedial action alternatives developed for the North Belmont PCE Site.

TABLE 9-1. REMEDIAL ACTION ALTERNATIVES FOR GROUNDWATER AT THE SITE.

NUMBER	NAME	DESCRIPTION
Alternative 1	No Action	Site is left "as is"; Five-year reviews conducted
Alternative 2	Limited Action	Deed recordations, Semi-annual groundwater monitoring Five-year reviews conducted
Alternative 3	Groundwater Exposure Abatement	City Water connections Wellhead treatment Semi-annual groundwater monitoring Five-year reviews conducted
Alternative 4	Groundwater Exposure Abatement plus Groundwater Treatment	City Water connections Wellhead treatment Semi-annual groundwater monitoring Treatment of contaminated groundwater Five-year reviews conducted

Descriptions of the alternatives developed for remediation of groundwater are discussed below. All of the alternatives except the "No Action" alternative include periodic monitoring of the groundwater including monitoring wells and potable wells for site contaminants to evaluate the site conditions and the migration of contaminants over time.

Note: Lead was found in two converted wells (residential wells that were converted to monitoring wells) above EPA's action level and North Carolina's Groundwater Standard of 15 ug/1. This occurrence of lead may be due to the pipes in these wells. Therefore, lead is not considered to be wide-spread problem at this Site, and no treatment has been proposed for lead. If monitoring shows that lead is more widespread than now believed, EPA will address this situation at that time.

A. ALTERNATIVE 1 - NO ACTION

Under the No Action alternative, the Site is left "as is", and no funds are expended for active control of the groundwater contaminant plume. Contaminated groundwater would remain uncontrolled allowing for the potential migration farther downgradient and deeper into bedrock. The NCP requires consideration of this alternative as a baseline for comparing other remedial actions and the level of improvement achieved. However, five-year reviews of the Site remediation decision, which consist of one round of sampling of selected monitoring and potable wells, would be conducted over an estimated 30-year period.

B. ALTERNATIVE 2 - LIMITED ACTION

In this alternative, deeds in the area would be required to record the fact that groundwater contamination exists under the property, and if a potable well is constructed, a strong possibility exists that the water will be contaminated with unacceptable levels of volatile organic contaminants. These recordations would remain in place until the groundwater quality would allow unrestricted use.

Semi-annual groundwater monitoring would be conducted on both monitoring wells and potable drinking water wells. Wells would be sampled for volatile organic compounds. The five-year reviews would be required because concentrations of chemicals remain at the Site above levels that allow unlimited use of the groundwater.

C. ALTERNATIVE 3 - GROUNDWATER EXPOSURE ABATEMENT

Under this alternative, all homes, churches, and businesses in the North Belmont PCE Site area not currently connected to the City of Gastonia or Gaston County public water supply would be connected. In addition, residents will also be given the option to obtain wellhead treatment of their private well, i.e. groundwater treatment such as a carbon filter unit would be connected to the private water supply well.

Semi-annual groundwater monitoring would be conducted on both monitoring wells and potable drinking water wells. Wells would be sampled for volatile organic compounds. The five-year reviews would be required because concentrations of chemicals remain at the Site above levels that allow unlimited use of the groundwater.

D. ALTERNATIVE 4 - GROUNDWATER EXPOSURE ABATEMENT PLUS GROUNDWATER TREATMENT

This alternative would include all the provisions of Alternative 3 plus would add treatment of the contaminated groundwater plume. The groundwater plume has been divided into three distinct plumes contained within the shallow, saprolite aquifer, the top of bedrock aquifer, and the bedrock aquifer. The treatment process will consist of a combination of two different process options: in-well vapor stripping and in-situ biological treatment.

The in-well vapor stripping and in-situ bioremediation technologies would be used throughout the plume. A treatability study would be performed to determine the optimum combination of these two treatment processes, and the best conditions for the use of each.

Additional studies and monitoring would be needed to determine the effectiveness of this combination of treatments. The study would also focus on determining the optimum treatment technology based on the unique aspects of each plume; i.e., the shallow plume would be more accessible than the other two, the bedrock plume would be more complex due to the depth and the presence of bedrock fractures. In addition, another factor that should be taken into consideration is the location of this Site; the majority of the plume is located in residential, privately-owned areas and the remedy would be designed so that it will not be overly intrusive to the neighborhood.

SECTION 10. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

In this section, each alternative is assessed using seven evaluation criteria required under CERCLA. Comparison of the alternatives with respect to these evaluation criteria are presented in summary form. This approach is designed to provide sufficient information to adequately compare the alternatives, aid in the selection of an appropriate remedy for the Site, and demonstrate satisfaction of the statutory requirements.

Each alternative is evaluated in terms of its ability to:

- Be protective of human health and the environment.
- Attain ARARs or provide grounds for invoking a waiver.
- Use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.
- Satisfy the preference for treatment that reduces toxicity, mobility, or volume of the hazardous substances, pollutants and contaminants as a principal element.
- Be cost-effective.

The seven evaluation criteria required to address the above CERCLA requirements serve as the basis for conducting the detailed analysis. The evaluation criteria are briefly described below.

1. Overall Protection of Human Health and the Environment determines whether each alternative meets the requirement that it be protective of human health and the environment in both short- and long-term, from unacceptable risks posed by hazardous substances, pollutants, or contaminants. This criterion is of key importance. While the remedy selected may on occasion seek a waiver of a given ARAR, the remedy selected must be protective of human health and the environment.

2. Compliance with ARARs is used to determine how each alternative complies with federal and state ARARs as defined in CERCLA Section 121, as discussed in Section 2, or provide grounds for invoking one of the waivers.

3. Short-Term Effectiveness addresses the impacts of the alternatives during the construction and implementation phase until remedial response objectives have been met. Alternatives are evaluated with respect to their short-term effects on human health and the environment.

4. Long-Term Effectiveness and Permanence addresses the results of a remedial action in terms of the risk remaining at the Site after response objectives have been met. The primary focus of this evaluation is the effectiveness of the controls that will be applied to manage risk posed by treatment residuals or untreated wastes.

5. Reduction of Toxicity, Mobility, and Volume addresses the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce toxicity, mobility, or volume of the hazardous substance as their principal element. This preference is satisfied when treatment is used to reduce the principal threats at the Site through destruction of toxic contaminants, irreversible reduction in contaminant mobility, or reduction of total volume of contaminated media.

6. Implementability addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation.

7. Cost estimates for the FS are expected to provide an order-of-magnitude evaluation for comparison of alternatives and are based on the site characterization developed in the RI. Capital cost, annual cost, and a present worth analysis are part of this evaluation. The present worth represents the amount of money that, if invested in the initial year of the remedial action at a given rate, would provide the funds required to make future payments to cover all costs associated with the remedial action over its planned life. The baseline present worth is computed at a discount (interest) rate of 7 percent over a 30 year period. Appendix A contains spreadsheets showing each component of the present worth costs.

The first two criteria are referred to in the RI/FS guidance manual (EPA 1988) as the "threshold factors", implying that for further consideration of an alternative, these two criteria must be satisfied. Alternatives which do not satisfy these threshold factors are not feasible (40 CFR 300.430(f)(1)(I)(A). Criteria 3 through 7 are referred to as "primary balancing factors" (page 4-25 of RI/FS manual), implying that these criteria are used to select the alternative among the feasible alternatives. There are two other criteria, state acceptance and community acceptance, which are provided by state and local agencies and the public. These criteria will be evaluated in the responsiveness summary. A detailed analysis of the alternatives using the above criteria is presented below.

A. Alternative 1 - No Action

Section 300.430 (e) of the NCP requires that the "no action" alternative be carried forward for consideration in the detailed analysis of alternatives as a baseline for comparison of the other alternatives. Under the no action alternative, funds are not expended for routine monitoring, control, or cleanup of groundwater contamination associated with the Site. Funding would, however, be required for the five-year review.

Overall Protection of Human Health and the Environment

This alternative would not provide any increased protection to human health or the environment. If no action is taken, the groundwater plumes would continue to migrate. Residents in the vicinity of the Site would continue to drink water from private wells that contain contaminants above the remediation goals. However, since soils at the Site did not contain any significant amounts of contamination, the concentration of contaminants in the groundwater would be expected to decrease with time due to natural processes and dilution. Under this action, monitoring or verification of the decrease would be conducted only at the five-year review stage.

Compliance with ARARs

The "no action" alternative would not address compliance with ARARs since there would be no active measures taken to reduce the contaminant concentrations. The volatile organic contaminant concentrations would be expected to decrease with time due to natural processes and dilution. Location- and action-specific ARARs do not apply to this alternative since further remedial action would not be conducted.

Short-Term Effectiveness

Because no activities would be implemented, there would be no additional impact on the community. Also, no construction or operation related impacts to the environment would occur, since no site activities would be performed.

Long-Term Effectiveness and Permanence

Because remedial actions would not occur, this alternative would not provide any long-term effectiveness or permanence. The long term risks caused by the contaminated groundwater would not be addressed. However, since the Site soils did not contain any significant amounts of contamination, the concentration of contaminants in the ground water would be expected to decrease with time due to natural processes and dilution.

Reduction of Toxicity, Mobility, and Volume

The "no action" alternative would provide no reduction in toxicity, mobility, or volume of contaminated groundwater.

Implementability

This criterion is not applicable because remedial activities would not occur.

Cost

The cost of this alternative consists only of 5-year review expenses. The total present worth cost for this alternative is approximately $291,066.

B. Alternative 2 - Limited Action

This alternative includes deed recordations and groundwater monitoring to protect human health and the environment. Under this alternative, no groundwater remedial measures will be undertaken at the Site. Five-year reviews are required under the NCP to determine if contaminants which remain on-site are causing additional risk to human health or the environment. As a result of this review, EPA will determine if additional site remediation is required. Five-year reviews are assumed to be conducted for a 30-year period.

Deed recordations would require amending the property deed to note that contaminated groundwater is located on the property. These recordations would be required on properties withtn the extent of the groundwater plume. These recordations would remain in place until the groundwater quality improved enough to allow for unrestricted use.

Groundwater will be monitored semi-annually for five years and annually for 25 years at approximately 30 existing monitoring, converted residential, and residential wells. Groundwater will be collected and analyzed for VOCs and lead.

Overall Protection of Human Health and the Environment

Deed recordations would alert residents of the potential hazards associated with the contaminated groundwater. They would limit exposure by warning of unlimited use of the groundwater, however, the recordations would not completely eliminate the risk of exposure or control the plume migration. Consequently, this alternative would not provide active protection of human health and the environment, although monitoring would reveal future threats to human health and the environment.

Compliance with ARARs

This alternative does not achieve the remedial action objectives of chemical-specific ARARs established for groundwater. Through natural processes and dilution, a decrease in the contaminant concentration would be expected with time. However, the magnitude of the decrease can only be qualitatively determined. It is not known whether natural processes and dilution alone would result in sufficient contaminant reduction to Maintain ARAR's. Location- and action-specific ARARs do not apply to this alternative since further remedial actions of an intrusive nature would not be conducted.

Short-Term Effectiveness

Implementing this alternative would require approximately one year. Groundwater monitoring could begin immediately. No significant environmental impacts would be expected during the sampling events.

Long-Term Effectiveness and Permanence

Properly implemented deed recordations would make residents aware of the contamination and thus potentially prevent ingestion and direct contact with contaminated groundwater, thereby reducing risk to potential users. Implementation of deed recordations with continued monitoring would be required indefinitely. The long term monitoring results and the actual effectiveness of the deed recordations would require periodic reassessment to determine the continued effectiveness of this alternative. If the degree of protectiveness to human health is insufficient, further remedial actions would have to be implemented.

Reduction of Toxicity, Mobility, and Volume

This alternative would not actively reduce the volume, toxicity or mobility of the contaminants. The size of the contaminant plume could increase with time. However, as the size of the plume increases the contaminant concentrations are expected to decrease via natural processes and dilution.

Implementability

This alternative would be readily implemented since there are no remedial activities of an intrusive nature being performed. The implementation of monitoring would present no difficulties. Implementing and enforcing deed recordations would require the cooperation of the state and local governments. The deed recordations may be subject to change in legal and political interpretations over time. Voluntary acceptance by adjacent property owners is questionable. Consequently, present or future property owners could choose to ignore or be unaware of the deed recordations. The recordation could also be lost during future property transfers. For the above reasons, the reliability of groundwater use deed recordations is considered uncertain. Legal services, field personnel and analytical laboratories necessary for implementation of this alternative are readily available. If additional monitor wells are required, well drilling services are readily available. Monitor equipment is readily available for groundwater sampling.

Cost

The total estimated present worth cost for this alternative is $432,255. The capital costs associated with this alternative include fees for implementing deed recordations and sampling equipment for monitoring. The O&M costs include long-term monitoring activities, which have been evaluated for a 30-year period.

C. Alternative 3 - Groundwater Exposure Abatement

Under this alternative, all homes, churches, and businesses in the North Belmont PCE Site area not currently connected to the City of Belmont or Gaston County public water supply would be connected. The North Belmont PCE Site area is defined in Figure 1-2 of this Record of Decision. In addition, residents will also be given the option to obtain wellhead treatment of their private well.

If requested, aqueous phase activated carbon units for removal of organics from groundwater supply would be installed at the wellhead of each residential well. Filtration will also be used as a precursor to the carbon treatment units.

This alternative also includes monitoring of groundwater from approximately 30 monitoring wells for 5 years on a semi-annual basis and for 25 years on an annual basis.

All connections to the Oty water system would require assistance from state and local authorities, especially in the areas of public notification, system design, and system construction. During initial procedures, an accurate count of the number of residences that are, or may be potentially affected by the groundwater contaminant plume would have to be determined. Once determined, EPA, state and local authorities would have to notify each resident and present the positive and negative aspects of a public water connection. Recognition of the fact that some residents will not want to accept public water supply connection is understood. After notification of the public, system design will begin. System design will require agreement between local authorities and EPA as to the total number of connections and total extent of pipeline. Following completion of the system design, system construction will commence. The system will most likely be installed by the local authority or qualified contractor.

Groundwater treatment at the wellhead will consist of the installation of a filtration unit and granular activated carbon (GAC) unit. Both of the filter systems will be installed in-line on present residential water systems. The systems will be designed to remove particulates from the influent groundwater as well as any organics present.

The first filtering unit of the in-line treatment system will consist of a particulate filter for removal of sediment and other matter from the influent water line. Following the particulate filter, the feed water will flow into a GAC system. The GAC system will consist of two units operated in a downflow fixed-bed mode, as it has been found to be most cost effective and produces the lowest effluent concentrations for low solids feed streams. Due to space constraints, each unit will contain a maximum of 50 pounds of carbon and will be replaced on a semi-annual to annual basis. Spent carbon will be taken offsite for regeneration or disposal.

To assess the effectiveness of the treatment system, the water effluent will be routinely monitored. Monitoring will be more frequent during startup and early operation. A typical/comparative groundwater monitoring program is described in Alternative 2 - Limited Action.

Overall Protection of Human Health and the Environment

This alternative provides protection of residents from contaminated groundwater during an extended period of time; therefore, risks to current and potential groundwater users are expected to decrease. However, this alternative does not preclude potential damage to the environment from migration of the current groundwater plume or migration of the plume to other areas.

Compliance with ARARs

Under this alternative, groundwater recovered from the wellhead treatment will be treated such that contaminant concentrations in the effluent will be below the remediation goals. However, this alternative will do little to control the migration of the overall groundwater plume.

Short-Term Effectiveness

Appropriate levels of protection will be used during installation of the treatment system and connection of residents to the city water supply. Disposal of any wastes generated during construction and operation will follow proper handling practices and should not have adverse environmental impact.

Long-Term Effectiveness and Permanence

Connecting affected residents to city water supply will provide a permanent remedy for protection of human health. The wellhead treatment would require regular maintenance and continued monitoring.

Reduction of Toxicity, Mobility, and Volume

Pumping at a water supply well would capture the plume on a limited basis and thus reduce the mobility. Treating the groundwater by aqueous phase GAC will reduce the concentrations of organics in the groundwater to the remediation goals and therefore, the toxicity and volume.

Implementability

This alternative involves installation of in-line groundwater treatment units, including filtration units and activated carbon units. These components are widely, available and the system can be assembled using normal construction techniques. All of the units of the treatment system are easily transportable and installed. For the organic contaminants detected at the Site, carbon adsorption is a proven technology and is often used as a means for treatment.

Water lines currently used by the city are in close proximity to many of the residences at the Site and would only require extensions of the lines to connect new residences. Permits and designs would have to be obtained by the local authority or qualified contractor.

Cost

Costs associated with the connection of residences to the public water supply include public notification, system design, and system construction. For estimating purposes, EPA assumed 75 residents would be connected to city water. Capital costs associated with the groundwater treatment unit portion of the alternative includes treatability study costs, installation of the filter and carbon adsorption units, and other associated instrumentation and equipment. For estimating purposes, EPA assumed that 50 residents would request wellhead treatment with operation and maintenance for a period of 1 year. The estimated total present worth cost for this alternative is $2,196,275.

D. Alternative 4 - GW Exposure Abatement Plus GW Treatment

This alternative includes all the provisions of Alternative 3 - Groundwater Exposure Abatement plus adds remediation of the groundwater that contains contaminant concentrations above the remediation goals, The major components of the groundwater treatment option include in-well vapor stripping and in-situ biological treatment.

The in-well VOC removal system volatilizes VOCs contained in groundwater and removes them as a vapor. The vapor is retrieved using vacuum extraction and is treated above ground by adsorption onto granular activated carbon (GAC). The VOC-enriched vapor is extracted and the partially cleaned water is returned to the aquifer. The system recirculates the groundwater through air-lift pumping. The system converts groundwater contamination into a vapor that is vacuum-extracted and treated. At the same time, air-lift pumping circulates the groundwater, which becomes cleaner with each pass through the in-well air stripper. The only input to the system is gas, which is injected into the well. The injected gas is typically air and can be recycled during the process.

The only output of the system is gas that is removed from the well; this gas contains the VOCs removed from the groundwater. After removal, this VOC vapor is adsorbed onto GAC. The GAC is regenerated and reused. No major facilities are needed for this technology. Power is needed to operate the pumps and compressors. The method itself involves no moving parts beneath the ground surface; however, careful packer and well designs would be required to successfully divert the groundwater from the well back into the saturated zone and to the water table.

The system is expected to operate approximately 10 years. The maximum amount of contamination is estimated to be removed within the first three years. After 10 years of operation, the treatment system will be evaluated for its effectiveness and the decision will be made on the continuation of this treatment.

The second component of the treatment system would be in-situ bioremediation to degrade the contaminants in the aquifer. The process involves the addition of microorganisms, nutrients, and an oxygen source (if aerobic) to the aquifer to enhance the natural degradation process. A treatability study will be conducted to determine the optimum concentrations of nitrogen, phosphorus, and other trace minerals that are required by the microorganisms to best degrade the organic compounds.

Groundwater monitoring will be conducted quarterly for the first three years, semi-annually for the next seven years, and annually for five years thereafter.

Overall Protection of Human Health and the Environment

This alternative would provide significant protection of human health and the environment through groundwater remediation and connection of residents to the city water supply.

Compliance with ARARs

Under this alternative, groundwater will be treated such that the contaminant concentrations in the effluent will be below remedlation goals. This treatment option will comply with chemical-, location-, and action-specific ARARs.

Short-Term Effectiveness

During installation of the treatment system, the usual precautions necessary for construction activities will be taken. The installation of wells and the treatment system will not involve a significant release of volatiles to the environment. Disposal of any wastes generated during construction and operation would follow established handling practices.

Long-Term Effectiveness and Permanence

The use of treatment processes provides a permanent method for treating the VOC contaminants in the groundwater. Spent carbon will be disposed in an approved facility or regenerated off-site.

Reduction of Toxicity, Mobility and Volume

Pumping at the wells would capture the plume and thus reduce plume mobility. Treating the groundwater would remove VOCs present in the groundwater to the remediation goals, thus reducing the toxicity and volume of groundwater contamination. This process would not release VOCs to the atmosphere.

Implementability

This alternative involves installation of groundwater extraction wells, small pumps, compressor, and GAC canisters, in addition to electrical connections. These components are widely available and the system can be assembled using common construction techniques. All the units of the treatment system are easily transportable and installed.

Cost

The total present worth cost for this alternative is approximately $4,716,400. Total capital costs are estimated to be $2,779,270.

E. Comparative Analysis of Alternatives

Presented in Table 10-1 are ranking scores for each evaluation criteria, excluding cost. Each alternative's performance was ranked on a scale of zero to five, with zero indicating none of the criteria's requirements were met, and five indicating all of the requirements were met. The ranking scores are not intended to be quantitative or additive. They are summary indicators only of each alternative's performance against the evaluation criteria. The ranking scores combined with the present worth costs provide the basis for comparison among alternatives.

Under overall protection, the no action alternative (Alternative 1) is ranked the lowest ("0") since contaminated groundwater is left onsite with no further actions being conducted. Alternative 2 is ranked slightly higher ("1") since deed recordations will be implemented in an attempt to limit contact with the contaminated groundwater. Alternative 4 is ranked higher ("5") than Alternative 3 ("4") since this alternative provides for treatment of the entire contaminant plume and would provide added protection to residents downgradient of the Site who are currently not affected by the Site.

Under compliance with ARARs, Alternatives 1 and 2 are ranked the lowest ("0") since contaminated groundwater remains onsite and chemical-specific ARARs are not met. Alternative 3 is ranked lower than Afternative 4 since ARARs will not be met over the entire plume.

Under long-term effectiveness, the no action alternative is ranked the lowest since contaminated groundwater would be left onsite with no further actions being conducted. Alternative 2 is ranked slightly higher since deed recordations would somewhat limit contact with the contaminated groundwater. Alternative 4 is ranked highest since contaminated groundwater over the entire plume would be remediated.

Under reduction of T/M/V, Alternatives 1 and 2 are ranked the lowest since contaminated groundwater remains as is. The mobility, toxicity, and volume are reduced in both Alternatives 3 and 4, however, to a greater extent in Alternative 4.

Under short-term effectiveness and implementability, Alternative 1 is ranked the highest since no further actions are being conducted. Alternative 2 is ranked next since the only actions taking place are deed recordations and groundwater monitoring. The remaining alternatives are ranked equally.

Table 10-1. Comparative Analysis of Alternatives

	1- No Action	2-Limited Action	3-Groundwater Exposure Abatement	4-Groundwater Exposure Abatement & Treatment
Overall Protection	0	1	4	5
Compliance w/ARARs	0	0	4	5
Long-Term Effectiveness	0	1	4	5
Reduction of M/T/V	0	0	4	5
Short-Term Effectiveness	5	4	3	3
Implementability	5	4	3	3
Present Worth Costs	$291,066	$432,255	$2,196,275	$4,716,400

SECTION 11. THE SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the NCP, the detailed analysis of alternatives and public and state comments, EPA has selected Alternative 4 as the groundwater remedy for this Site. The remedy includes connecting all homes, churches and businesses in the "North Belmont PCE Area" as depicted in Figure 1-2 of this document to the City of Belmont public water supply; optional installation of granulated carbon filters on private wells with operation and maintenance of the filter for one year with a filter replacement after the first year of operation; and groundwater treatment by insitu biological treatment and in-well vapor stripping. At the completion of this remedy, the risk associated with this Site has been calculated to be within the accepted risk range determined to be protective of human health and the environment. The total present worth of the selected remedy is $4,716,400. Tables 11-1 and 11-2 provide a detailed cost estimate for the chosen remedy.

A. Groundwater Remediation

Groundwater remedial will address the contaminated groundwater at the Site. The major components of the groundwater treatment option include in-well vapor stripping and in-situ biological treatment. The in-well VOC removal system volatilizes VOCs contained in groundwater and removes them as a vapor. The vapor is retrieved using vacuum extraction and is treated above ground by adsorption onto granular activated carbon (GAC). The VOC-enriched vapor is extracted and the partially cleaned water is returned to the aquifer. The system recirculates the groundwater through air-lift pumping. The system converts groundwater contamination into a vapor that is vacuum-extracted and treated. At the same time, air-lift pumping circulates the groundwater, which becomes cleaner with each pass through the in-well air stripper. The only input to the system is gas, which is injected into the well. The injected gas is typically air and can be recycled during the process.

The only output of the system is gas that is removed from the well; this gas contains the VOCs removed from the groundwater. After removal, this VOC vapor is adsorbed onto GAC. The GAC is regenerated and reused. No major facilities are needed for this technology. Power is needed to operate the pumps and compressors. The method itself involves no moving parts beneath the ground surface; however, careful packer and well designs would be required to successfully divert the groundwater from the well back into the saturated zone and to the water table. The system is expected to operate approximately 10 years.

Table Number: 11-1 PRESENT WORTH CAPITAL COST

Alternative No. 4 -GW Exposure Abatement plus GW Treatment

Site Name: North Belmont PCE Site — Discount Rate: 7%

Site Location: North Belmont, NC — Date: July 1997

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST DOLLARS
MOBILIZATION			
Transport Equipment/Staff	1	15,000	$15,000
Temporary Facilities	1	15,000	$15,000
INWELL VAPOR STRIPPING			
Installation/equipment	20	25,000	$500,000
INSITU BIOREMEDIATION			
Treatability Study	1	25,000	$25,000
Reinfiltration System	1	80,000	$80,000
CITY WATER CONNECTIONS			
Installation/75 residents	10,560 feet	60/foot	$633,600
Design specifications, regulatory approval, permits (20%)			$126,720
WELLHEAD TREATMENT			
Installation per residence	50	5,500	$275,000
Treatability Study	1	lump sum	$10,000
HEALTH AND SAFETY EQUIPMENT/TEMPORARY UTILITIES	1	lump sum	$30,000
SUBTOTAL - CAPITAL COST			$1,710,320
CONTRACTOR FEE (10% of Capital Cost)			$171,032
LEGAL FEES, LICENSES, AND PERMITS (5% of Capital Cost)			$85,516
ENGINEERING & ADMINISTRATIVE (15% of Capital Cost)			$256,548
SUBTOTAL			$2,223,416
CONTINGENCY (25% OF SUBTOTAL)			$555,854
TOTAL CAPITAL COST			$2,779,270
PRESENT WORTH O&M COST			$1,937,130
TOTAL PRESENT WORTH COST			$4,716,400

Table Number 11-2 REMEDIAL ACTION OPERATION COST

Alternative No. 4 -GW Exposure Abatement Plus GW Treatment

Site Name: North Belmont PCE Site Discount Rate: 7%

Site Location: North Belmont, NC Date: July 1997

ITEM DESCRIPTION	ANNUAL QUANTITY	UNIT COST ($)	TOTAL COST PER YEAR	OPERATION TIME (YEARS); OCCURENCES
WELL MAINTENANCE	1	lump sum	$20,000	10
GW Monitoring				
Quarterly				
VOC Analysis	120	$125/sample	$15,000	3
Labor(sampling)	4	$2,400/event	$9,600	3
Report Preparation	4	$2,500/event	$10,000	3
Semi-Annual				
VOC Analysis	60	$125/sample	$7,500	7
Labor(sampling)	2	$2,400/event	$4,800	7
Report Preparation	2	$2,500/event	$5,000	7
Annual				
VOC Analysis	30	$125/sample	$3,750	5
Labor(sampling)	1	$2,400/event	$2,400	5
Report Preparation	1	$2,500/event	$2,600	5
5-YEAR REVIEW	1	$2,500/report	$2,500	2
Report Preparation				
WELLHEAD TREAT				
Labor/Maintenance		8% of capital	$22,000	1
Monitoring of effluent	50x4 =200	$125/sample	$25,000	1
GAC replacement	50	$530/unit	$26,500	1
INWELL VAPOR STRIPPING				
Maintenance	20	$12,000	$240,000	3
Maintenance	20	$6,000	$120,000	7
BIOREMEDIATION				
Additives	12	$2,500/month	$30,000	10
System Maintenance	12	$500/month	$6,000	10

TOTAL PRESENT WORTH O&M COSTS - $1,937,130

The second component of the treatment system would be in-situ bioremediation to degrade the contaminants in the aquifer. The process involves the addition of microorganisms, nutrients, and an oxygen source (if aerobic) to the aquifer to enhance the natural degradation process. A treatability study will be conducted to determine the optimum concentrations of nitrogen, phosphorus, and other trace minerals that are required by the microorganisms to best degrade the organic compounds.

The groundwater treatment is expected to last approximately 10 years. Groundwater monitoring will be conducted quarterly for the first three years, semi-annually for the next seven years, and annually for five years thereafter.

Performance Standards

The goal of this remedial action is to restore the groundwater to its beneficial use. Based on information obtained during the R1, and the analysis of all remedial alternatives, EPA and the State of North Carolina believe that the selected remedy will be able to achieve this goal.

Groundwater contamination may be especially persistent in the immediate vicinity of the contaminants' source, where concentrations are relatively high. The ability to achieve remediation levels at all points throughout the area of attainment, or plume, cannot be determined until the treatment system has been implemented, modified, as necessary, and plume response monitored over time.

Groundwater shall be treated until the following performance standards are attained throughout the contaminant plumes:

Contaminant	Remediation Level	Risk Level
Lead	15 ug/l	NA
Methylene Chloride	5 ug/l	1E-05
Cis-1,2-Dichloroethene	70 ug/l	HI = 0.4
Trichloroethene	2.8 ug/l	1E-06
Tetrachloroethene	1 ug/l	1E-06
Bis(2-ethylhexyl)phthalate	3ug/l	1E-06
Chloroform	1 ug/l	1E-06
1,1-Dichloroethene	1 ug/l	1E-05

Hazard Index (HI) - Relates to non-cancer risks
1E-06 Risk Level - Probability for carcinogenic effects
(See Section 6 of this document for an explanation of HI and Risk Levels)
NA - Not applicable. Risk from lead is not calculated using HI or risk level.
ug/1 - micrograms per liter

If it is determined that certain portions of the aquifer cannot be restored to their beneficial use, all of the following measures involving long-term management may occur, for an indefinite period of time, as a modification of the existing system:

a) engineering controls such as physical barriers, or long-term gradient control provided by low level pumping, as contaminant measure;

b) performance standards may be waived for the cleanup of those portions of the aquifer based on the technical impracticability of achieving further contaminant reduction;

c) institutional controls may be provided maintained to restrict access to those portions of the aquifer which remain above rernediation levels;

d) continued monitoring of specified wells; and

e) periodic reevaluation of remedial technologies for groundwater restoration.

The decision to invoke anyor all of these measures may be made during a periodic review of the remedial action, which will occur at 5 year intervals in accordance with CERCLA Section 121(c).

The remedial actions shall comply with all ARARs (See Section V11).

B. Additional Sampling Requirements

Additional groundwater sampling shall be conducted to further define the extent of contamination. Specifically, the following shall be obtained at a minimum:

- Additional monitoring wells are needed in the following areas:
- West and southwest of Source Area A (across Woodlawn Dr), surficial zone;
- South of Source Area B and MW-10, top of bedrock zone; and
- East of Source Area B and TW-11/MW-10, top of bedrock zone.

- Periodic private well sampling to determine if any of the residents' wells exceed the Emergency Response action level of 70 ug/1 for PCE.

SECTION 12. DOCUMENTATION OF SIGNIFICANT CHANGE

CERCLA Section 117(b) requires an explanation of significant change from the preferred alternative presented in the Proposed Plan dated July 29, 1997. In the proposed plan, Alternative 4 was chosen for groundwater at the North Belmont Site.

In the original proposed plan, EPA had proposed to allow residents the opportunity to have carbon units put on their private well so that they could continue use of these wells without fear of ingesting contaminated water. EPA had proposed operation and maintenance of these carbon filter units for a period of ten years. This Site is a fund-lead Site; there are no viable potentially responsible parties. Therefore, according to the NCP, the State would be required to pay for the operation and maintenance of these carbon filter units after the first year of operation, The State would take over the O&M on the groundwater treatment and monitoring system after 10 years.

However, a comment from the State was received after the Proposed Plan was put out for public comment. By letter dated August 6, 1997, NC DEHNR stated that "We would not support selection of a remedy which would require the State to pay for operation and maintenance of these filter units. We would support this remedy only if the residents who opted for these units agreed to assume operation and maintenance costs."

Therefore, the remedy will include installation and monitoring of the carbon unit for one (1) year with a replacement unit to be installed at the end of the first year. Following this one year period, operation and maintenance costs associated with continued effectiveness of the carbon unit shall be the responsibility of the well owner. This change is reflected in the new cost estimates for Alternatives 3 and 4. EPA will continue to monitor a number of private wells to determine if residents are being exposed to contaminants above the MCLs.

Other changes in the cost estimate include the addition of five extra inwell vapor stripping wells, and five years of groundwater monitoring.

APPENDIX A

RESPONSIVENESS SUMMARY
NORTH BELMONT PCE SITE
NORTH BELMONT, NORTH CAROLINA

This Responsiveness Summary for the North Belmont Site (hereinafter referred to as the "Site") is divided into the following sections:

SECTION I OVERVIEW

The overview summarizes the public's reaction to the remedial alternatives listed in the Proposed Remedial Action Plan (Proposed Plan). The Proposed Plan outlines the various methods of remediation at the Site and discusses EPA's preferred alternative.

SECTION II BACKGROUND ON COMMUNITY INVOLVEMENT

The background section summarizes the major community concerns identified in the Community Relations Plan and public comment period on the Remedial Investigation/Feasibility Study (RI/FS) and Proposed Plan.

SECTION III SUMMARY OF COMMENTS AND QUESTIONS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA'S RESPONSES

This section responds to all significant comments and concerns received by EPA during the public comment period.

I. OVERVIEW

The Proposed Plan for the Site was issued in July 1997. EPA's public comment period for the Site was originally scheduled to run from July 29, 1997 through August 29, 1997. The comment period was extended an additional 14 days to September 12, 1997.

EPA conducted a public meeting on August 7, 1997. At this meeting, the public was given an opportunity to ask questions and to comment on the remedial alternatives outlined in the Proposed Plan and EPA's preferred alternative. The comments and EPA's responses are included in Appendix B, the transcript of the public meeting. In general, the public supported EPA's preferred alternative to connect all residents, businesses and churches within the Site area to city water, and to treat the contaminated groundwater.

II. BACKGROUND ON COMMUNITY INVOLVEMENT

EPA's involvement with the North Belmont Site began in 1991, when EPA's Emergency Response Unit connected North Belmont Elementary School and a number of residents to the City of Belmont public water supply. EPA began preparation of a work plan for the RI/FS in late 1995. Since that time, EPA has implemented a community relations program in the Site area designed to inform the public of Site activities and solicit input from the community regarding its site-related concerns and questions. These efforts have included disseminating printed public information materials and conducting public meetings and information sessions to coincide with technical milestones at the Site.

EPA conducted community interviews with residents in April 1996 to identify community issues and concerns regarding the Site, and from this information prepared a Community Relations Plan outlining Agency outreach activities. A local information repository was also established to house EPA documents developed during the Superfund process. The repository is located in the Belmont Branch of the Gaston County Public Library System.

Interviews conducted with residents in the immediate vicinity of the Site revealed concerns about water quality and health effects of chemicals in the groundwater. Key issues raised by area residents during the 1996 interviews were:

- Water quality of private wells
- Cost of connection to City water
- Health effects on children from contaminated water
- Loss of property value

Public meetings were held in: June 1996 to discuss the upcoming RI/FS; and July 1997 to discuss the Proposed Plan. Based upon the attendance at public meetings and the overall feedback EPA has received from the public, the level of community interest in the Site is characterized as medium. In general, residents have responded favorably to Site remediation.

Display ads announcing the meetings were placed in two area newspapers. Fact sheets were mailed to individuals on the Site's mailing list announcing major milestones and meetings. EPA also conducted meetings with city and county officials to keep them informed and abreast of ongoing activities. Telephone conversations were also held with citizens in the area.

III. SUMMARY OF COMMENTS AND QUESTIONS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA'S RESPONSES

This section contains a summary of verbal questions and comments received during the public comment period. No written comments were received.

Comment: A resident on School Street who has city water, wants to continue to use their well to water their yard. They would also like to continue to get their well tested.

Response: Residents can continue to use their private wells for uses other than for drinking water and showers. EPA will continue to test a number of private wells periodically.

Comment: One homeowner in the Site area took the initiative to connect to city water after the contamination was discovered in 1991. The would like to know if they can get reimbursed for this connection, since they would have been connected by EPA during this remediation.

Response: EPA is looking into this situation to determine if some type of compensation can be given to the resident.

Comment: The City of Belmont City Manager wanted a list of names and addresses of those who will need city water. He also stated that engineering plans will have to meet State and City specifications for extension of water lines.

Response: EPA will work closely with city officials to ensure that all Site residents will be connected properly to the City's public water supply.

APPENDIX B
PUBLIC MEETING TRANSCRIPT

NORTH BELMONT PCE SUPERFUND SITE
BELMONT, NORTH CAROLINA

7:10 P.M.
August 7, 1997

Worth Belmont Elementary School
210 School Street
Belmont, North Carolina

PUBLIC HEARING

<IMG SRC 97203U>

Charlotte Court Reporting, Inc.
Post Office Box 11629
Charlotte, North Carolina 28220
(704) 373-0347
Toll Free (800) 456-9424

A P P E A R A N C E S

Ms. Diane Barrett
Community Relations Coordinator

Ms. Giezelle Bennett
Remedial project Manager

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This is a transcript of the Proposed Plan Public Meeting conducted by the United States Environmental Protection Agency, being taken by Muriel A. Marcus, Notary Public, at North Belmont Elementary School, 210 School Street, Belmont, North Carolina, on the 7th day of August, 1997, beginning at 7:10 P.M.

* * * * * * * *

MS. BARRETT:

Can you see it? You can't -- I'll show you where it is. The site discovery is here and we -- the site was discovered some years ago and our office at EPA in Atlanta got it in 1995. We're going through the writing process right now, developing all of our data for that. The remedial investigation has begun and that's why we're here tonight, to go through our remedial investigation and the feasibility study are both -- go hand in hand.

The remedial investigation spans -- if you were -- live right around the area, you might have seen people out doing all kinds of sampling of the groundwater and wells, the soil and so forth. That's a part of the remedial investigation when they go out and take the samples to determine, well, what contaminants are here, what quantity in here, how deep are the contaminants and so forth. So all of that -- the samples come back and they're analyzed and we have a report cover the investigation of what's in the repository, as well as a feasibility study.

The feasibility study is a study of all the possible remedies that can be used to treat the contaminants that we've found. And then, step five right here, is the public comment period and that's what we're getting to right now, where we have the Record of Decision that will be coming up after we have the public comment period. We come in and tell you, "This is what we've found and this is what we propose to do. What do you think? How do you feel about this?" So that's our purpose here tonight, to get your input, to find out what you think about it and we have a thirty-day comment period, but it's been extended fourteen more days.

Once all the comments have come in and been answered, we will then propose a responsiveness summary. That is attached to what we call the Record of Decision, which is this one right here, the Record of Decision. These are all legal documents that we prepare and they are admissible in court and so forth like that, so they are legal.

Then after the Record of Decision, which says this is -- these remedies that have been selected based on all the data that we have found and all the information that the public has given us. This is what we choose. Then after that, in step number seven, the cleanup plan, that's the remedial design and the remedial design is like a blueprint of what we're going to do and that taken a little while to do. Usually the -- let me back up just a little bit.

The remedial investigation and feasibility study process, that can usually take anywhere from a year to two years. it just depends on the complexity of the site and what all we have to do. The cleanup process plan, right under number seven step there, the remedial design and the remedial action, that can take about six months to a year, just, there again, depends on the complexity of the treatment technology that we have to design.

So all of that -- these steps here are yet to come, then the long-term cleanup itself. That's what we call the remedial action and that's when the plants themselves are actually constructed and treatment begins, the soil being dug up or groundwater being pumped and treated. That's going to be in that number eight.

Then all during this whole process, we have the community relations aspect. With all the various things that we do, we have a community relations plan already prepared. We have the information repository, as I said, at the Belmont branch library; we value such contacts and we have, like, (inaudible) here and voices in effect here, too, (inaudible), keep in touch with them and the state people, local folks. Then we have informal meetings and formal meetings like we're having tonight. We also issue fact sheets, have press releases and different things.

Also, there are what we call technical assistance grants available. These grants are for a sum of $50,000, which is given to -- awarded to a community group that wants to form to recruit or hire a consultant to help them go through all the stages that we're developing to get a better understanding of the technical aspects of the project and to provide us with comments. So a technical assistance grant is available for citizens that want to form a group.

And then there's another group that we call the CAG, for short. That's the community advisory group and those are not funded, however. Those are voluntary and there are a lot of communities that do have these kinds of folks get together and hear about what's going on and gather on a monthly basis to find out and have their input on what's being said.

Also, we have a toll-free number. It is on the literature that you have, the fact sheet, the green fact sheet that you got in your hand right there on the very back page. It should be on the back page. It's 1-800-435-9233. So if at any time you have any questions, please call. we are -- Giezelle and myself are there and if we happen to be out of the office, we've got answering machines and --

UNIDENTIFIED SPEAKER:

Repeat that phone number, please.

MS. BARRETT:

1-800-435-9233. And that will get you to our secretaries there in the office and they will give information, switch you to us. We will be glad to assist you and help you in any way we can with your questions or you see something, you know, if you have any concerns, please call. That's what that 800 number is for. We want to hear from you. And that pretty much covers, I think, what I wanted to tell you from the community relations aspect.

I appreciate your time and thank you very much. And, Giezelle, if you want to come up and start, she's going to tell you what all they've found and I think that will bring us up to date.

MS. BENNETT:

I'm just going to quickly switch sides so I won't be standing in front of anything. Can y'all see that in the back?

(Discussion regarding visual aid equipment)

MS. BENNETT:

As Diane mentioned, this is the North Belmont PCE Site Proposal Plan Public Meeting and in this meeting, we want to discuss EPA's proposed cleanup remedies for the site.

Now, the site is located in a mixed residential and light commercial area. It consists of two former dry cleaning facility locations. They're shown as site A, which is the Roper's Shopping Center on Woodlawn Drive. It was operated from 1960 to 1975 and the owner reportedly disposed of the dry cleaning solutions that contained hazardous chemicals on the ground in back of his shop. Site B is located at the intersection of Suggs and Acme and that was reported by a citizen to have been a dry cleaning facility before 1960.

Now, just a brief background about the site. The site was discovered in February of 1991. The Gaston County Health Department sampled the North Belmont Elementary School well and they found volatile organic compounds or what we refer to as VOCs. The Region 4 Emergency was notified and they, with the health department, sampled twenty-five additional private wells and they again found the volatile organic compounds. As a result of this sampling, some residents were connected to city water. Others chose not to be connected.

Now, this is a pictorial view of the extent of the groundwater contamination as it existed in 1991. In

July of '91 the state investigated the site and then in October, '95, EPA began a long-term investigation, referred to as the remedial investigation.

Now, as I had mentioned, the objectives of the remedial investigation are to determine the nature and extent of the contamination, determine where the contamination is going and determine the potential receptors. That means who will be affected by this contamination.

Now, as you-all probably recognize, this shows your neighborhood; this shows our RI study area. The two red dots show the former dry cleaning facilities. There's also a green triangle that shows a previous refrigerator repair shop that we also thought might be a source of groundwater contamination and it also shows a machine shop.

(Discussion regarding the site)

MS. BENNETT:

Now, the first thing we thought we should do was to take a well survey and I know a lot of people were contacted about whether or not you still use your private well and what usage you use it for. This shows what we now believe is the well use in this area.

The green shown the people who are on city water and this part that's in -- it's up here -- that's hard to see, too, I guess, from where you're sitting, but basically what it is is green, blue, red and what other color is there?

MS. BARRETT:

Yellow.

MS. BENNETT:

Yellow. The blue dots on there, those are the ones we really need to know about, as to whether or not people are still using the residential wells and so that will come into play later. That's why we have that larger map over there.

This figure shows our initial sampling locations. that we came out in March, 1996; we took samples of residential wells and also prior residential wells that were now converted into monitoring wells and based on this sampling, one additional residence was connected to city water, due to high levels of organics. This well was previously free of organics, in 1991, so that told us that that plume that you previously saw, that area of contamination, had moved.

We took soil samples to determine if there was any additional contamination in the soil that may also be a source of contamination in the groundwater. We found a few metals in the soil but none of the volatile organic compounds that we had been seeing in the groundwater.

We took surface water and sediment samples in a nearby stream to determine if the site was impacting the stream. Again, we found a few metals but none of the volatile organics that would be associated with the site. In connection with the surface water sediment sampling, the EPA also conducted a bio assessment in the area to determine if the stream was healthy, that is, could organisms live in this stream. The conclusion was that the stream was in fair condition, which means that it wasn't pristine, but it wasn't in really bad shape either, but we could not determine whether this was due to the stream being in an urban area or because of site effects.

This figure shows the shallow wells that we put in.   Now, we have three different aquifers at this site: a shallow, which is approximately thirty to thirty-five feet below land surface, and these are -- this is a pictorial of the wells that we put in and this shows the contamination that we found in the shallow aquifer.

This figure is of the tetrachloroethene plumes that we found. We found values as high as 2,200 micrograms per liter and just to give you a reference, the EPA's drinking water standard is five micrograms per liter and the state groundwater standard is 0.7.

We also found both PCEs, trichloroethene and 1,2-dichloroethene. These are all volatile organic compounds.

So based on the depth of some of the residential wells that were contaminated, we also conducted an investigation of the deeper aquifers. This figure shows the wells that were installed both at the top of bedrock -- I don't know -- you can refer to the figure over there that Diane has up of the water cycle -- where these are right above the rock that's down below the surface and we also had some that were installed into the bedrock. The top of bedrock ranged between 35 to 110 feet deep and this map shows the top of the bedrock plume, which contains tetrachloroethene or what we call PCE. These levels ranged as high as 2,500 and that map is also the map on the wall, the one furthest from me. As you can see, it's a big difference between the one we had in '91 and the one now we have in 1997.

The next figure, which is the one closest to me, shows the contamination that we found in the bedrock plume and these levels range up to 3500 micrograms per liter.

Our next step, once we identified the contamination, was to -- what to do about it so, therefore, the next step was a feasibility study. The objectives of the feasibility study were to develop cleanup goals for the groundwater, identify and screen different ways of cleaning that up and then identify different alternatives based upon the different technologies that we found.

The cleanup goals are based on ARARs, which are applicable or relevant and appropriate requirements, and there are three types of those. They are chemical-specific, such as laws that specify the drinking water standards, as I previously told you; location-specific, such as laws that protect wetlands, and action-specific, such as land disposal restrictions and restrictions on the discharged treated water.

And these are the cleanup goals that were developed for the Worth Belmont PCE Site. These are based on both state maximum contaminant levels and EPA levels. As you can see, the first column shows the name of the contaminant; the second was the maximum that we found in the groundwater and the third is our goal, which means that's what we want to get the groundwater to or below.

The next thing we did was look at the varying technologies for cleaning up groundwater. We knew where the contamination was and the levels that were -- we were required to obtain and now we want to achieve our goals. So, as you can see, we have a big variety. We look at everything first and then determine if it has even the slightest chance of working at the site. And as a result of the initial screenings, we had a number of viable options that passed our initial screenings, anywhere from just putting it on the deed to off-site disposal.

Now, these were further screenings to effectiveness, will it work on the contaminants that we found at the sight? How easily can it be implemented, the availability of the equipment and the compliance with the various laws and regulations and the cost of it. Is it high, is it moderate or is it low compared to other similar technologies?

Based upon that, we came up with four alternatives for cleaning up the groundwater and achieving the cleanup goals. The first is called No Action and I know it's kind of hard to figure that's going to meet our cleanup goals, but this is required under our National Contingency Plan and that's -- what that would be is the site would be left just as it is today with no further EPA work. We would then be required to conduct a review of the site every five years to determine if the contaminants remaining on the site are causing any additional risk to human health or the environment. As a result of this review, the EPA can determine if additional site remediation is required.

So the cost that you see there is just for us to come up once every five years and sample approximately thirty wells and prepare a report, and that would be done over a thirty-year period. The cost is about four hundred -- basically about $400,000. No, 291,000. I read it wrong.

The next alternative, or Alternative 2, is Limited Action and what that would be would be the deed recordation. That means everybody who lives in the area that had contaminated water, this will be recorded on your deed, saying that you had contaminated water under your property and if you installed the well on that property, then contaminated water may result. This also includes the periodic sampling of thirty wells over the next thirty years and, of course, the five-year reviews, since the contaminants would be left on site. And this would be about $400,000.

Our third alternative includes the groundwater monitoring and the five-year reviews, but it also includes connecting all homes, churches and businesses in the site area to the City of Belmont public water services lines. These are people that are not currently connected now. In addition, people would be given the option to obtain wellhead treatment of their private wells. This would be carbon filters would be placed on the well to treat the water and filter out contaminants before it got to your house.

Originally, in your proposals, we had envisioned paying for the upkeep of these filters and sampling them periodically and changing the filters out yearly. This was proposed in the fact sheet that you had. However, in a cleanup when we don't have a private party paying for the cleanup, such as this one, the Superfund has to pick up the tab for this and the State of North Carolina will be required to take over the upkeep of these wells after a year or so. So, therefore, it was decided that if you choose the wellhead treatment, EPA will maintain it for a year and then after that, you would be required to take over the maintenance of it and we have coated it out. The cost for changing the filter, maintaining it and having somebody come out and check it will be about $1,000 a year.

In the fourth alternative --

UNIDENTIFIED SPEAKER:

Excuse me.

MS. BENNETT:

-- or the third alternative will be about 3.1 --

UNIDENTIFIED SPEAKER:
Excuse me. To that per well?
MS. BENNETT:
Yes.
UNIDENTIFIED SPEAKER:
A thousand dollars per year per well?
MS. BENNETT:
Right.
UNIDENTIFIED SPEAKER:
Per individual?
MS. BENNETT:
Per well.
UNIDENTIFIED SPEAKER:
The homeowner would have to pay that?
MS. BENNETT:
Per well, right.
UNIDENTIFIED SPEAKER:
For the homeowner?
MS. BENNETT:
Right.
UNIDENTIFIED SPEAKER:
What happened, though, to the State?
UNIDENTIFIED SPEAKER:
Yeah. What is --
* * * * * * * *

UNIDENTIFIED SPEAKER:

You mentioned the State would be required or would pick that up --

MS. BENNETT:

Well, --

UNIDENTIFIED SPEAKER:

-- after a year.

MS. BENNETT:

Right. That -- that would be per our agreement with the State.

UNIDENTIFIED SPEAKER:

But the -- then why would the individual do that and be responsible for it if the State did it?

MS. BENNETT:

Well, I mean, -- let me --

UNIDENTIFIED SPEAKER:

Only through taxes, I know that.

MS. BENNETT:

Okay. But let me get through these alternatives first and then when we open it up for questions, I'll explain it more thoroughly.

The cost of the third alternative is about 3.1 million.

In the fourth alternative, we would include all the provisions in the third alternative except that we would add groundwater treatment and in this one, EPA would attempt to clean up the contamination that you see in these two photographs or these two shots. We would propose a new technique called in-well vapor stripping, which would cause air to strip the contaminants from the groundwater and then that air would be treated with a carbon filter. And, also, we will include in-situ bioremediation, which would enhance and speed up the degradation process already happening in the aquifer. We are proposing that this alternative would be carried out for ten years as opposed to the thirty-year time frame of the other two.

Now, the EPA's preferred alternative, the one that we are proposing tonight, is alternative 4, which includes the city water connections, the optional wellhead treatment, the cleanup of the contaminated groundwater, along with the groundwater monitoring and the five-year reviews. This would be operational for ten years and cost 4.6 million dollars.

Now, as Diane said, we have a comment period until September 1st. We would like to hear from you and let us know what you think about the city water connections, about the wellhead treatment, et cetera. So that --

* * * * * * * * *

MS. BARRETT:

Well, let me just say one thing, then. As you make your comments, if you'll please give your name so the court reporter can get them because it's supposed to be a verbatim transcript of the meeting so we'll all know who makes the comments. And if you want to comment, please state your name. Thank you.

MS. BENNETT:

And if you -- you can stand up and -- so everybody can hear your questions.

MS. BARRETT:

There was a comment over here.

MR. SMITH:

I don't really have much of a comment. My name is Merle Smith. Those proposals, can there be a copy given to each one here to study and to look at?

MS. BARRETT:

Yes, sir. In your fact sheet, there is a brief write-up of those.

MS. BENNETT:

In the green.

MS. BARRETT:

The green one there that you have?

MR. SMITH:

The green one?

MS. BARRETT:
Yeah, look through those. Here they are: Alternatives 1, 2, 3 and 4.
MR. SMITH:
Okay. Now, 4 is the one y'all are proposing; right?
MS. BARRETT:
That is correct. But you'll have to look at it with alternative 2 because it does include -- I mean, 3. It does include 3.
MR. AUSTIN:
My name is Randy Austin. If you connected all the people that are in the affected area to ground -- to city water, how long would it take for this to naturally clean itself up?
MS. BENNETT:
Well, the level is what we call high, you know, over 1,000 parts per million or micrograms per liter, so I -- I have no way of knowing. It would continue to spread, so at the beginning near Roper's, the concentration would eventually get lower, but downstream, as we see it moving further downstream, those people would be affected.
MR. AUSTIN:
So while it's beginning to spread, it's also

diluting itself?

MS. BENNETT:

Right; that's true.

MR. AUSTIN:

So over what period of time would it take for it to dilute itself down to a point where it'd reach acceptable levels? I mean, y'all -- it sounds to me like y'all have jumped to a conclusion to go out and put in wells and filter the water and bring the levels down to nothing, but if I remember my biology correctly, it has to degrade over some period of time. It's not like radiation that's going to last for a million years, so with dilution and over time it has to degrade, but how long a period of time? And if you put everybody on city water, it seems reasonable to me that if nobody's using that water for any human purpose, potable water in particular, there shouldn't be a problem.

MS. BENNETT:

Well, the problem there wouldn't be this neighborhood that we see right here. It would be the next neighborhood further down and eventually, we'd have to go over there and say, "Well, it came from over here and we put all those people on city water, so now if you're continuing to use your private well, now you're pulling that water toward you."

MR. AUSTIN:

But even if you do that, it's going to bee considerably less than 4.6 million dollars. I mean, even though the EPA may be paying for this, that's still our tax dollars. I mean, we're still paying for it.

MS. BENNETT:

Well, no, Superfund is based on a tax of chemical and petroleum industries.

MR. AUSTIN:

I know what it is, but it's still coming from from our tax dollars. It's still coming from tax dollars somewhere. Somebody's paying for this and the general public somewhere is paying for this and it just doesn't seem reasonable to spend that much money doing it if, over time, it's going to work itself out and you just move people to city water.

MS. BENNETT:

Well, that's one of the things we're doing, is we're going to try this in-situ bioremediation and what that would be is that would help speed up that degradation process. In that process, you put in nitrogen and other nutrients that the microorganisms use to eat this kind of contamination up, so we would try to speed that process up. I mean, as you can see, our -- our levels that we need to get down to for people to be able to drink this water are extremely low and if you look at the numbers that we have now, it would take quite a bit of time for those numbers to get down to acceptable levels.

MR. AUSTIN:

Okay. I've looked at all the charts that you had and what you had in 1991 and what's moved to 1995 and 1996. It doesn't look like the movement is that significant. It looks like you'd be able to calculate where the plume in going to go over the course of the next ten, twenty or thirty years and what the cost would be to convert all those people that would eventually be affected into city water. Even if you do that, it still seems like it'd be a lot less expensive than spending the 4.6 million dollars.

MS. BENNETT:

Yeah, but one of the things you have to realize, our mission is not only to protect human health, but it's to protect the environment as well. Our first mission is to restore this groundwater to beneficial usage. I mean, if everywhere we went we ended up writing off the groundwater because it was contaminated, you know, eventually we wouldn't have any safe drinking the water.

MR. AUSTIN:

But how long do you write it off for? That's the question that I've asked that hasn't been answered. I mean, how long would it take to clean itself up?

MS. BENNETT:

And I'm saying I don't know.

MS. BARRETT:

Well, it could be hundreds of years as slow as groundwater does move.

MS. BENNETT:

We just don't know.

MS. BARRETT:

Well, to bring up one point, I just wanted to show the difference. On the initial plume -- I don't know if you can see that. It shows here on Magnolia and Apricot, right in this area here, that was the original plume. So you can see the size there and then the way it looks now, it's far beyond Apricot and on down here. So it's -- it has spread quite a bit.

MR. AUSTIN:

But what -- I guess the other point is what levels, what's the detectible levels? As the plume spreads, what's the detectible level out at the edge of the plume and how much does it increase as it goes in?

MS. BENNETT:

But, see, the drinking water standard here in North Carolina is one. That's as low as we can detect on a -- in a laboratory, so everywhere we find it, it's above our standards. Like I said, in '91, we had people who didn't want to go on city water because their wells were fine. When we came back in '96, one lady had over 300 parts per billion in her well. She didn't know it; she was drinking it, and that's far above our level of one that we want to get down to. So you can say yes, it has decreased from the initial 15,000 that was found in '91, but would you want to be the person drinking 300?

MR. AUSTIN:

That's not --

MS. BENNETT:

And the only way we can discover that is until it actually gets in your well and you're drinking it. So --

UNIDENTIFIED SPEAKER:

Isn't it true that --

MR. FOREMAN:

My name is Allen Foreman and I'd like to say that as far as I'm concerned, clean water is one of the few things that I would like to see exist in this country.

We've contaminated so much already that I don't want to put a dollar value on cleaning up this water and who knows what effects it has already bad and what it would have in the future if we've done nothing.

The second thing I'd like to say is that I noticed in this area when they were doing the testing that they did several wells on my property and I had asked -- I have a house that, at this time, we even had a joint well with the house next to us. The well was on the other owner's property and I was trying to find out about this sampling and testing and never did. I did have someone to come one time to take a sample from the inside of my house, which they say could not be real accurate or as accurate as from the well, but I never heard any results of that, so I then -- I just tapped onto the city myself. The question being those people -- I know of others that have done that out of fear, just not knowing what was going on. Are they going to be reimbursed for the expense that they incur themselves is you choose alternate 3 or 4?

MS. BENNETT:

No; we have no provision for reimbursement. As I said, the alternative would include connecting those who are not currently connected to city water.

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MR. FOREMAN:

Okay. The man who lives across the street from me was reimbursed.

MS. BENNETT:

I don't --

MR. FOREMAN:

And I was told not to tap onto city water at that time due to the EPA was still doing work and I should wait and see and I waited about ninety more days and then I -- I went ahead and tapped on, and that's -- thats what I want to know. I know of another that has tapped on and two others that wanted to, but we were instructed to wait to see what the results were, but I have children at home and I -- I didn't want to just -- I don't want my kids drinking this stuff.

MS. BENNETT:

Can you come up and talk to me after the meeting?

MR. FOREMAN:

Yes.

MS. BENNETT:

Okay.

MS. THOMPSON:

My name in Debra Thompson. I was wondering about the side effects of people who drank this stuff from, what, '85 to now or '65, whenever it was done.

What are we supposed to do about anything that comes up as far as health problems in the future? Are we responsible for all this or can you contact or make the person who done it responsible for it or what are we supposed to do when all this cancer-causing is -- we've all got it and our kids have got it? How long does it take for you to drink this stuff before you can -- it starts harming your health?

MS. BENNETT:

Well, we have no way of knowing that. What we look at are current conditions. We have documents that say what are the effects of these chemicals and, you know, we can talk about each individual one, but as far as cumulative effects or overall effects over time, we don't have those kind of statistics. All we can say is whether or not they -- it's a probable cancer-causing agent or a possible cancer-causing chemical. Doc, can you -- can you help us out here from the health department?

UNIDENTIFIED SPEAKER:

Yeah; we had -- we had (inaudible) --

UNIDENTIFIED SPEAKER:

Toxicology tells us that these are --

MS. BENNETT:

Wait. Can you state your name?

MR. HUNT:

Boyce Hunt, environmental health administrator. Toxicology tells us that these contaminants are carcinogens. It depends on the person, depends on your age, your weight, et cetera, a number of factors, the whole physiology of how much you drink and what other health defects you may have thrown in, so many factors, there's no way that I can tell you or I don't know of a physician or a toxicologist or anyone else who could answer that question.

MS. BENNETT:

As far as those responsible, this site is a -- what we call a Fund B. We have no responsible parties here, so all cleanup expenses will be paid by the EPA and the State.

MS. THOMPSON:

Okay. I've got one other question. This proposal number 2 about the deeds, that's going to devalue our land if we decide to sell because nobody's going to want to buy contaminated land. If you put this on our deed, there's no point in us trying to sell. If you do that proposal, how is it going to benefit us in any way?

MS. BENNETT:

Which one, 2?

MS. THOMPSON:

Uh-huh. About putting it on our deed about being connected -- our water being contaminated.

MS. BENNETT:

Well, see, 2 wouldn't say that your land was contaminated; it would say that the groundwater beneath your land is contaminated and, really, according to real estate laws, if you are selling your house and you know your groundwater is contaminated, you should tell the potential buyer so they won't try to put in a private well and then get contaminated water.

MS. THOMPSON:

That's my point. If you tell them or if it's on your deed, they're -- they're going to say, "Well, I don't want this property because the groundwater's contaminated and I don't want any part of it," the same reason we don't like it, because it's a health problem.

MS. BENNETT:

Right. Well, that -- you know, we're going to -- the alternative that we're proposing here is going to try to clean this up a lot faster that if it would degrade on its own.

MS. BARRETT:

And, of course, that wouldn't be a deed recordation either. If we're cleaning it up, it would not be any kind of record on the deed because the water's being cleaned up.

MS. BENNETT:

But the fact of the matter would still be that the groundwater beneath your property is contaminated.

Sir, wait. This gentleman behind you has been trying to --

MR. BLACKWELL:

My name is Eugene Blackwell and I was going to ask isn't it true that all groundwater has some contamination? That's the first question, and the second one is are you telling us that the Belmont water, if we hook onto it, has less than one or one contamination?

MS. BENNETT:

Well, to answer your first question, there are a number of different things in -- in water, different metals and everything, but these kinds of chemicals aren't naturally occurring, so we wouldn't expect to see them in the groundwater. Different places we sampled, you know, they all contained those. A lot of places we always see aluminum and iron and that kind of stuff in the water, but everywhere you go you don't see trichloroethene or tetrachloroethene.

And your second question was -- what was your second question?

MR. BLACKWELL:

The Belmont water, does it have any contaminant in it, city water?

MS. BENNETT:

Well, the city water, since it serves over twenty-five people, is governed by a clean drinking water -- well, the State's Drinking Water Act, so yes, they have to go by these standards. Their water is tested periodically and they have to meet these standards, not only these, but a lot of others.

MR. BLACKWELL:

But do they meet the standards is the question?

(Inaudible response by health department)

MS. BENNETT:

The health department is saying yes, they do. If they aren't, they're fined, so you would see it in your tax dollars, I suppose.

MR. BROOME:

My name's Larry Broome. The -- you got -- it doesn't look like you've got a handle on it, I don't think. It don't make any difference what the price of it is. Water is our most valuable resource and we won't -- without water, we won't function anyway and that thing's like a fire: if you're going to put it out, now is the time to put it out, just don't keep talking about it and putting dollar marks on it. The best thing is if you just want to clean the thing up, it's like a fire. If you're going to put it out, put it out and just don't let the thing keep on and on and on.

I'm not in the habit of -- I don't worry about myself giving it to the neighbors, you know. I don't care nothing about it spreading on down the line and working on somebody else trying to get free with city water, which probably city water's got enough chemicals in there to kill you anyway without drinking out of a river, but, you know, this, I think it's here and I think it ought to be addressed. I think it ought to be cleaned up.

I don't care -- the administration spends more than that five million dollars. They waste that much on airplane flights, so I don't care. I think we ought to have it cleaned up. I mean, that -- that's my opinion and I don't speak for anyone else, but it's there, clean it up. I don't see no sense in talking about it. It's there and it's growing. I'm going to die anyway. I don't care enough about leaving it to somebody else. I mean, I'd just do it and -- but it's on our property, but I'd like -- I'd like to have it cleaned up. I don't care if it costs me more in taxes. I mean, they're going to tax me to death anyway.

MS. BARRETT:

Thank you.

MR. PERKINS:

My name is George Perkins. I don't live in this community, but I'm a representative of Centerview Baptist Church which is right down the street at the end of School Street. Within seventy-five or 100 yards, there's con- -- and our water's not contaminated, but within seventy-five or 100 yards on each side or all around the church, the water is contaminated.

Will our water eventually become contaminated and what's the chances that it will be? We paid $60.00 a quart to get our water tested and so far, it has not been contaminated, but, actually, my question is will it eventually become contaminated?

MS. BENNETT:

You're at the corner? Do you know where that location --

MR. PERKINS:

No, down at the end of School Street, just a couple of tenths of a mile down here.

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MS. THOMPSON:

Right at my house, Giezelle, the church at my house.

MS. BENNETT:

Okay.

MS. BARRETT:

Yeah, the corner.

MS. BENNETT:

Well, it depends on how deep your well is. As we showed you, the shallow water, which is less than thirty-five feet, that's a real localized area as far as the groundwater contamination, but if it's deeper than thirty-five feet, yes, it will eventually get there.

MR. AUSTIN:

Randy Austin, again. If you decide to go with proposal 4, when will you begin?

MS. BENNETT:

Well, this site has to be placed on the National Priorities List to receive fund money since we don't have a potentially responsible party. We would have to do a remedial design, which would look into the -- what we call the probability, the treatability of these different alternatives, so we could be looking at probably about three years before we start.

MR. AUSTIN:

Okay. The other thing that you mentioned was that the EPA, according to the Superfund, would come in and put the wellheads in and the filters and then after a year, then we would be responsible to change the filters. Does the State pay for that or do we pay for that?

MS. BENNETT:

Well, after a year, you would be responsible for paying it. We start it up, make sure it is functioning properly, have somebody come out and make sure, after a while, it was continuously functioning properly, but after then, if you want the treatment on your well, yes, you would have to be responsible for maintaining it. That's why we are emphasizing that we want all -- the -- that whole, entire area, churches, homes, businesses, connected to city water because that way we know you're drinking safe water. We don't have to worry about you maintaining your filter, you forgetting about it, you can't afford it or whatever. That way, you'd have city water and we know your water will be safe.

MR. AUSTIN:

How much is this plume going to spread in three years?

MS. BENNETT:

Well, I don't know that. It has spread from right there -- from the shopping center to where it is now from '91 to '97, over the last six years, so I don't know.

MS. CRAMER:

My name is Dot Cramer. I'm a resident on my mom's property on O'Daniel Street where you have a test well and you tested the shallow end and then you tested the deeper well and at first we thought it was really bad contaminated and we -- nobody drank the water. We'd carry water and use bottled water and then we got a letter saying it wasn't too bad; it wasn't to a point where it would be safe but to keep checking it.

My question in we're anxious not to drink the water anyway since it's already been said it was and now it is not or may be safe, but how long would it be before we'd -- we'd be connected to the city water?

MS. BENNETT:

Well, as I told that gentleman there, we have a number of steps we have to do before we actually start the cleanup process.

MS. CRAMER:

Does that include the connections?

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MS. BENNETT:

Yeah. That would be one of the first things we did.

MS. CRAMER:

Three years?

MS. BENNETT:

We could do that before we did anything else, but we will periodically come back and sample some of the private wells in the meantime. We would definitely do that within this three-year period.

MS. CRAMER:

We're concerned about it because we have rental houses there and our renters, we feel responsible for them.

MS. BENNETT:

Right. That's one of the reasons why we went ahead and started this investigation. Normally, we wait until the site gets on the National Priorities List before we even start the investigation, but our on-scene coordinator, who worked closely with Doc, recommended that we go ahead and start this investigation, so we did that earlier than normal.

MR. SMITH:

Merle Smith again. Not being able to see the map too well there, how is this thing spreading on Woodlawn

Street now? Site A is right here and the water will run out here and that's on Woodlawn and I live just down here from the cemetery. Now, how far is this getting --

MS. BENNETT:

Yeah, but we --

MR. SMITH:

It seems like it's going that way according to my --

MS. BENNETT:

Well, that's the way groundwater is flowing; however, we did test one private well over there. Mr. Roper's son has a well over there and they use --

MR. SMITH:

We share the same well.

MS. BENNETT:

About 500 feet deep.

MR. SMITH:

Yeah.

MS. BENNETT:

And the only explanation we have is that, you know, from the pumping of that well, that it has somehow hit a fracture down there that was contaminated that was connected with the water underneath the dry cleaners and it had just pulled it over that way, but that area will be included in the city water connections.

MR. HAAS:

My name is Jimmy Haas. On this cleanup that is number 4, what will be done with the water that y'all strip in the carbon filters? Will it go into the city sewer?

MS. BENNETT:

No; that's one of the unique things about this new treatment technology. It constantly recycles the water so the water never comes up out of the ground. It continuously cleans it, so it -- the only thing that comes up is the air and the air is treated with a carbon filter.

MR. HAAS:

That's different from the Jack Hughes?

MS. BENNETT:

Right. In the Jack Hughes site they are actually pulling the water out of the groundwater -- out of the ground and then treating it and then putting it into the publicly owned treatment water for the sewer system; right. But we aren't proposing that here and one of the main reasons we aren't is because this is a -- more of a residential community. We don't have a big block of land like they do and so I don't know if

you have been by there. They have a big treatment
tower that they have and we don't want to just put one
of those in somebody's back yard so --

MR. HAAS:
That's why I was wondering if it was going to be
similar to that. I know with that site over there, it
takes up a good bit of room.

MS. BENNETT:
Right. Yes; we were trying to look for
alternatives where we would be the least intrusive on
the neighborhood and also clean up the groundwater.

MS. TOMSON:
My name is Jolee Tomson. Our house is on Site B
and do you feel like that since we're on city water
that that takes care of all the risks, just putting you
on city water and right now the risks are gone?

MS. BENNETT:
Right. That would be your only risk. We didn't
find any contamination in the soil on your property, so
just so long as you don't put in a private well and
drink the water, then you're fine.

MR. ROBINSON:
My name in Elliot Robinson. I have two questions.
I'll ask one and then the other. What happens if the
-- toward the end of the ten-year period you find

you're not reaching your goals as you might wish? Is there a re-evaluation done?

MS. BENNETT:

Well, as I said, we have what we call five-year reviews. After every five years, we look at the remedy and we evaluate it to see if it's continuing what it's supposed to do and if it's not, yes, we will evaluate after five years and after ten years and if that comes up, then we'll have to look at something else or, you know, just re-evaluate the whole thing.

MR. ROBINSON:

The other question is in the middle of the process, if some new technology becomes available, is it possible to introduce that to the site rather than what you say you're going to do in the beginning?

MS. BENNETT:

Well, it would have to be pretty radical and a whole lot better than what we're doing for us to switch in the middle of the project.

Does anybody else have any other questions?

MS. BARRETT:

I want -- I just want to ask the audience one thing. Are -- do you most of you understand how groundwater flows, how it moves or anything like that? Because a lot of times in the -- when we go to the site, they don't. People think it's a river.

Well, I don't know if you can see this or not, but it shows how groundwater -- groundwater flows like this down here. Groundwater flows in all these cracks like this right there. It can come from the rain or whatever gets on the soil surface leaches down, okay, leach or percolate down, and it goes in these cracks and it flows through these cracks and to answer your question awhile ago about the depth of your well, all right. See this well. This is 500 feet and if the contamination's up here and your well draws from this depth, it really wouldn't have contamination from this spot. It could from something else flowing this way, but not from, say, this site. But what Giezelle was saying is that the contamination from the site might have gotten down in these cracks, come on down and gotten down there in that one location.

So that's kind of how groundwater flows. It flows through these cracks right here and it -- and that's why I said, in answer to your question a little bit earlier, it does flow rather slowly because it's going through these little cracks.

MS. BENNETT:

It seeps.

MS. BARRETT:

Yeah.

MS. BENNETT:

That's called fractures.

MS. BARRETT:

Right, fractures. Fractures. But that's how it flows and, then, too, it shows different wells. This would be like a city well there and this would be like a citizen's well with more shallow surfaces here and, then, too, a lot of times it flows into a water body so here it shows water coming to this water body and water coming to this -- I mean, the groundwater moving into this water body so that kind of helps maybe, I hope, to give you a little bit of understanding about the groundwater itself, about how it moves and flows.

UNIDENTIFIED SPEAKER:

The rivers and the -- like, the South Fork River and all is polluting the ground as much as this is.

MS. BARRETT:

Well, whatever is -- say --

UNIDENTIFIED SPEAKER:

Going through the ground.

MS. BARRETT:

Yeah. Whatever in here will eventually move toward a major water body 'cause it's being drawn that way, but, too, like, -- and one things that was brought

up, if all of these wells, say, in this area stop
pumping, but if this guy over here is still pumping,
well, he can draw contamination toward him because he's
pumping when everybody else has stopped. He would have
a greater pull on water coming to him, to his well.

UNIDENTIFIED SPEAKER:

So if somebody, say, ten houses on up above you is
on city water and you're not, you done sucked all the
contamination down the well. Do you --

MS. BARRETT:

You're going to pull it to you faster because
with, say, 100 wells pulling, all right, you're all
pulling at a certain rate, but then 99 stop and one's
pulling, then it's bypassing all these others to that
one.

MS. BENNETT:

That's how we think that the groundwater got where
it is today because so many people were -- in that
immediate area were put on city water and they closed
down their wells and those people further out were
still pumping.

UNIDENTIFIED SPEAKER:

Who paid for that?

MS. BENNETT:

EPA did.

UNIDENTIFIED SPEAKER:
Well, why would they not be responsible for these other people that's here that's got wells now?

MS. BENNETT:
Well, I'm going to talk to him after the meeting about that, but generally, what we do is we have to look at the current risks right now and, currently, he's not at risk and he's on city water.

MR. FOREMAN:
It cost me $1,000 not to get that way.

MS. PARKER:
My name's Kay Parker. Wasn't they given the choice to get on the city water or keep their well water?

MS. BENNETT:
Some people were and I think we had seven who chose not to connect to city water back in '91. But this time, we don't want anybody to opt not to because we might not be back, so it would --

MR. PAYSEUR:
Okay. I -- I'm Willie Payseur and when I found out the well was contaminated, when they dug in with city water, I hooked up and cut my well off, but nobody -- it's 325 feet deep and nobody has ever come out and checked it and how can you put mine on it, on the deed

that it's contaminated if nobody's never checked it?

MS. BENNETT:

Well, the only thing that we're saying is if we chose Alternative 2, then the whole area would be put on it because if it either has it or may have the potential to have it.

MR. PAYSEUR:

And before that, my water had been fine, 'course I haven't had it checked since then.

MS. BARRETT:

What is your name, sir? The court reporter didn't get it.

MR. PAYSEUR:

Willie Payseur.

MS. BARRETT:

Thank you.

MR. PAYSEUR:

201 School Street.

MR. SMITH:

Excuse me. Merle Smith. Let's just clarify one thing here, though. Y'all are not proposing alternative number 2. Y'all are proposing alternative number 4, --

MS. BENNETT:

Right.

MR. SMITH:

So we need to get the deeds off our minds.

MS. BENNETT:

Right.

MR. SMITH:

'Cause that's not what you're proposing.

MS. BENNETT:

Well, that's not what we're proposing, but we do open this up for public comment. Like, if all of you said that, "No; we don't want to be connected to city water. We don't want any of that stuff. Just leave the site as it is," well, I don't know if we could leave the site as it is, but --

MR. SMITH:

Well, I don't feel that anyone in here is wanting proposal number 2, you know.

MS. BARRETT:

But when we come for a proposal meeting, we have to put all of them on the floor for your consideration.

MS. BENNETT:

Right.

MR. GADDIS:

I'm Miles Gaddis. The last time that dry cleaners was used was in '75?

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MS. BENNETT:

Right.

MR. GADDIS:

And in '91 they found contamination and from '91 to '97 it has spread a whole lot. Well, what happened in those twenty-two years? It just stayed in one place?

MS. BENNETT:

Well, but the thing about it is is when the dry cleaner disposed of it, he disposed it on the ground, so it had to have time to seep through ground to the groundwater and then start moving, so if he would have had a well and he'd injected it right into the well, right into the groundwater, you probably would have seen it a whole lot faster.

MR. GADDIS:

Well, what it did, in twenty-two years, you know, it hadn't moved very far, you know, and then all at once it started flowing a lot. I just wondered about that.

MS. BENNETT:

Yeah. There's a lot about groundwater that we don't know.

MS. MEHAFFEY:

My name is Edna Mehaffey. I'm just wondering, will you do each well, pump it out and clean it or do you do a site and it cleans up the wells in this area?

MS. BENNETT:

Say that again?

MS. MEHAFFEY:

Do you go to each well and clean it or do you clean, like, a well and the next -- the houses around that area will be okay? Do you know?

UNIDENTIFIED SPEAKER:

On your cleanup --

MS. BENNETT:

We wouldn't use the private wells. We would come in and put in what we call some treatment wells for the --

MS. MEHAFFEY:

Oh, you don't mess with our wells? Okay.

MS. BENNETT:

We couldn't use your well.

MS. MEHAFFEY:

Okay. Okay.

MS. BENNETT:

In fact, we would close your well up probably.

UNIDENTIFIED SPEAKER:

(Inaudible).

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MS. MEHAFFEY:

I didn't know if you went down in our wells or, you know, how it --

MS. BENNETT:

That's right. And each well would have a -- what we call a cone of influence. It would influence water within so many feet around it and so that's part of the design. We would have to find out exactly how many of those we would have to put in to clean up this entire --

MS. BARRETT:

Well, it's a good question.

MS. BENNETT:

Yeah.

MS. BARRETT:

You think you know about wells (inaudible)

(Many people in the audience talking at once)

MR. FOREMAN:

I've read in the fact sheet, it seems to me like I read in there something about a septic tank in Site A --

MS. BENNETT:

Right.

MR. FOREMAN:

-- that was never found.

MS. BENNETT:

Well, we could --

MR. FOREMAN:

It could possibly still be seeping these poisons or contaminants into the water. What will be done to find that septic tank or can it be found?

MS. BENNETT:

Well, I don't know. I mean, the State came out in '91 and looked for it and didn't find it. We came out in '96 and early '97 and couldn't find it and you saw the plot there that showed all the different soil samples that we took. We didn't find any of the organics in the soil.

MR. FOREMAN:

Well, I think what I was after when I -- in your cleanup sites you were predicting days when this stuff could start to be cleaned up and if you chose Alternative 4 and you were going to clean this water and that septic tank is still out there and it's still pumping contaminants in, is that not going to delay the process?

MS. BENNETT:

It would, but we don't believe that's the case because the contamination levels have gone down since '91. Like I said, you know, some of those they had found in '91 were 15,000. Now the highest that we've found was 3500, so like I told that gentleman, they're going down but not nearly fast enough to say that it will eventually clean itself up within our lifetime anyway.

MS. GALLOWAY:

It's only after we get through the cleanup process that we'll be able to go back to using our wells or do we have to stay on city water?

MS. BENNETT:

Well, that's a hard question. We wouldn't want anybody to use their well until we got back down to those levels that we showed you, which are our cleanup goals, and so I guess if and when you got down there and you made the determination that the water was safe, then you could probably put in another city -- I mean, put in another private well.

MS. GALLOWAY:

But what would happen if, like he said about this septic tank, if we went back on our wells and it got contaminated again? Would we just have to do all this over again or --

MS. BENNETT:

No; we would monitor -- we are going to be monitoring the groundwater to make sure the levels are going down, so -- and like I said, we wouldn't recommend that anybody put in a new private well or use their old private well until we determine that the water was safe to drink, and that may or may not happen. We don't know.

MS. BARRETT:
What was your name? Excuse me.

MS. GALLOWAY:
Julie Galloway.

MS. BARRETT:
Julie. Thank you.

MR. GADDIS:
Miles Gaddis again. If your well has been checked and your water is good, would it be all right to water your lawn and all with it?

MS. BENNETT:
Well, you know, you and I talked about that before.

MR. GADDIS:
Yes.

MS. BENNETT:
That's one of those things where if we put everybody on city water and you are the only well that's pumping in the whole area, --

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MR. GADDIS:

That could pull it to it.

MS. BENNETT:

Yeah. But, like I said, now, our toxicologists have said that the volatiles don't uptake into the vegetables and things, but, then, you would be spraying that water and volatiles would be in the air.

MR. GADDIS:

You know, when I used to water my garden and yard, you know, with my well water, it grows beautiful, but this city water I got, it dies.

MS. BENNETT:

Well, I don't know. I mean, you were one of the people I had in mind when we talked about doing the wellhead treatment and putting the carbon on the wells and everything.

MR. GADDIS:

Yes; uh-huh.

MS. BENNETT:

So I don't know if you want to look at maintaining a filter or if you can find somebody to keep it in operation.

(inaudible comments from the audience.)

MR. GADDIS:

You can buy a lot of city water for that.

MR. PERKINS:

George Perkins again, the representative from Centerview. Last year they came down and asked permission -- I assume it was the EPA -- came down and asked permission to dig two wells on our church property, on some property that we had -- not adjoining the church property, but the church owns across the street over there on Centerview Street and they dug two wells and they told me that they would send me a copy or a report of what they found, but they never did.

Can you tell me how deep they went and the findings they found and --

MS. BENNETT:

I surely could. Come up to me and talk to me after this.

MR. PERKINS:

Okay.

MS. BENNETT:

All right. We sent out letters, though.

MR. PERKINS:

We didn't get one, to my knowledge. If we did, it didn't get to my hands. I'm not saying we didn't get one. I'm saying I didn't get it.

MS. BENNETT:

Okay.

MR. BLACKWELL:

They dug a well here -- this is Gene Blackwell. They dug a well here on the school property back about four or five years ago. What was the result? What did they find?

MS. BENNETT:

They dug a well on --

MR. BLACKWELL:

They drilled a well; they drilled a well.

MS. BENNETT:

I was one well drilled on the school property and it was a deep well --

MR. BLACKWELL:

Yes.

MS. BENNETT:

-- and contamination was not found in it.

MS. BARRETT:

Any other questions?

MS. BENNETT:

Well, I want to emphasize, like I said, we would like for all people to be connected to city water who are not currently connected to it, and in that regard, that well survey that we have is really important. We'll be coming back around and doing another one to update that, but, like, we have a lot of them that are unknown, you know, or some that say they're on city water which may not be on city water and so if somebody comes around and asks you, please make sure that you respond so we'll know exactly who needs to be connected.

MS. TOMSON:

Jolee Tomson. Is your proposal that you're going to -- be based on our comments tonight totally or who will make the final decision on what proposal that gets chosen?

MS. BENNETT:

Well, EPA, jointly with the State, makes the final, but we always present it to the public. We don't want to shove anything down anybody's throat, so any comments that people have, we'll definitely listen to them.

MS. TOMSON:

Well, I say clean it up whatever the cost.

MS. BARRETT:

And not just tonight 'cause there's a comment period which ends September the 12th, so you can write your comments in.

MR. PERKINS:

So what you're saying in we won't know until September the 12th what you plan to do up there?

MS. BENNETT:

No; it'll be after that. That's when the comment period closes.

MR. PERKINS:

Okay. That's -- okay. And how long after the 12th will we know what you decide -- what you have decided to do?

MS. BENNETT:

It'll be about a month or so after that and Diane usually puts out another fact sheet that says what the final or what we call the Record of Decision was that has been signed by an official EPA which will give our position (inaudible)

MS. BARRETT:

Uh-huh.

MR. PERKINS:

And every resident and every business and every church will get a copy or a notification of what you plan to do?

MS. BARRETT:

Who is on the mailing list will get a copy, --

MR. PERKINS:

Okay.

MS. BARRETT:

-- but I will also put a notice in the paper. I don't know if y'all saw the ads I put in the paper --

(Affirmative comments from the audience.)

MS. BARRETT:

Okay. Okay. So that's one -- another way. I put it in the paper also.

MR. BROOME:

Why does it take so long to get going?

MS. BARRETT:

Well, --

UNIDENTIFIED SPEAKER:

Bureaucracy.

MS. BARRETT:

-- you got to draw up all kinds of plans. It's just like when you're going to build a building, if you're going to build a house, you've got to have all kinds of blueprints, you got to -- you know, you got to account for your -- your foundation, concrete, pipes, wires, everything that's involved.

(Inaudible comments from the audience.)

MR. BROOME:

Well, I guess what I'm trying to say is, you know, there ain't no (inaudible) been found in all these years and they're still getting in here?

MS. BENNETT:

Well, what the -- the main thing on this site is the National Priorities List. I mean, if we had a responsible party who was ready to gear up and go with this, we could go ahead and the very first thing we'd do is get everybody on city water. But because this money is coming through, you know, government, through the Superfund, then it has to be on the National Priorities List. That takes time and then after that, we can start.

MS. BARRETT:

Well, one thing, too, EPA was just brought into this situation in 1995, so we just really started.

MR. BROOME:

Okay.

MR. BLACKWELL:

The EPA checked the well, now, at the church much earlier than that.

MS. BENNETT:

Well, the emergency people came out in '91; right.

MS. BARRETT:

Yeah. The emergency response team --

MR. BLACKWELL:

You said the well they drilled on the school property was deep. What do you mean by deep? How deep was the well?

* * * * * * * * *

MS. BENNETT:

It went into the bedrock. I show the bedrock varies anywhere between thirty-five to over 100 feet deep.

MS. BARRETT:

We've gone from the surface down.

MR. BLACKWELL:

But you don't know how deep they went?

MS. BARRETT:

I -- I don't know. There should -- there's a record, somewhere. Doc, do you have any idea how deep the school well was?

MR. THOMPSON:

(Nods head affirmatively)

MS. BARRETT:

You're shaking your head yes. How --

MR. THOMPSON:

I'm Doc Thompson, Gaston County Health Department. We -- there in a record of the wells in the reports. I don't have any idea how deep the well is. I do know, like you said, it's a deep well. When they refer to deep wells, they refer to alleged bedrock. Any time you go into bedrock, it's referred to as a deep well When you refer to a surface well, that's a sample, like a bored well, which in a very shallow well, but you don't extend into the bedrock, so that's what we mean by a deep well, is that it was extended to the level of bedrock, whether it's thirty-five feet or whether it's 500 feet. That's considered what we call a deep well because they extend past the sapolite area into the bedrock area.

MS. BARRETT:

But there are records that would show the depth. We just, off the top of our heads, don't know.

UNIDENTIFIED SPEAKER:

Well, I had a bored well that was about seventy feet deep. It didn't go into the rocks.

UNIDENTIFIED SPEAKER:

That's right. It was a bored well. You can't penetrate rock with no bore.

UNIDENTIFIED SPEAKER:

Well, they went down a 100 foot in theirs -- in mine and 225 foot and it's bedrock.

MS. BARRETT:

Did you have a question? You have raised your --

UNIDENTIFIED SPEAKER:

I'm going to catch you after the meeting with mine 'cause it's -- I don't want to take up all these people's time.

* * * * * * * *

MS. BARRETT:

Any other questions? Good questions. Good questions.

MS. BENNETT:

We appreciate the turnout.

MS. BARRETT:

It's really good.

MS. BENNETT:

Like I said, we would like to hear from you. All of these will be recorded. It will then -- we will then prepare a -- prepare a responsiveness summary that has all of your comments into it. In it we will have responses to those comments.

MS. BARRETT:

And it will all be put in the repository.

UNIDENTIFIED SPEAKER:

I was just starting to ask. All of this information is at the library?

MS. BARRETT:

That we're talking about tonight, yes, ma'am, it in. It's -- when you go in the Belmont branch, when you walk in the door there beside the desk, it's straight back on the top shelf on the -- a wall. It's about seven volumes and they're three-ring, white notebooks, but they're there.

MS. BENNETT:

Well, we'll be around after the meeting if you want to come up and speak with us or ask any questions.

MS. BARRETT:

Thank you very much and good night.

(WHEREUPON, the meeting was concluded at 8:25 P.M.)

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STATE OF NORTH CAROLINA)
) C E R T I F I C A T E
COUNTY OF MECKLENBURG)

I, Muriel A. Marcus, Notary Public, do hereby certify that the aforesaid meeting was taken by me and transcribed under my supervision and that the foregoing sixty-six (66) pages constitute a verbatim transcription of the proceeding conducted herein. I do further certify that the persons were present as stated.

I do further certify that I am not of counsel for or in the employment of any of the parties to this action, nor do I have any interest, financial or otherwise, in the result thereof.

IN WITNESS WHEREOF, I have hereunto subscribed my name, this 29th day of August, 1997.

<IMG SRC 97203V>

My Commission Expires:

June 16, 2002

PLEASE NOTE that unless otherwise specifically requested in writing, the tape for this transcript will be retained for thirty days from the date of this certificate.

<IMG SRC 97203W>
<IMG SRC 97203X>

State of North Carolina
Department of Environment,
Health, and Natural Resources
Division of Waste Management

James B. Hunt, Jr., Governor
Wayne McDevitt, Secretary
William L. Meyer, Director

September 19, 1997

Ms. Giezelle Bennett
Superfund Branch, Waste Management Division
US EPA Region IV
61 Forsyth Street, 11th Floor
Atlanta, Georgia 30303

RE: Conditional State Concurrence with the
September 1997 Record of Decision
North Belmont PCE Site
North Belmont, Gaston County, NC

Dear Ms. Bennett

The North Carolina Superfund Section has received and reviewed the attached Record of Decision (ROD) for the North Belmont PCE Site and concurs with the selected remedy subject to the following conditions:

1. Our concurrence on this ROD and of the selected remedies for the site is based solely on the information contained in the attached ROD and to the conditions fisted here. Should we receive additional information that significantly affects the conclusions or remedies contained in the ROD, we may modify or withdraw this concurrence with written notice to EPA Region IV.

2. Our concurrence on this ROD in no way binds the State to concur in future decisions or commits the State to participate, financially or otherwise, in the cleanup of the Site. The State reserves the right to review, comment, and make independent assessments of a future work relating to this Site.

P.O. Box 29603, Raleigh, North Carolina 27611-9603 Telephone 919-733-4996
FAX 919-715-3605

3. If, after remediation is complete, the total residual risk level exceeds 10 -6, the State may require deed recordation/restriction to document the presence of residual contamination and possibly limit future use of the property as specified in NCGS 130A-310.8.

4. A typographical error was found in the first sentence of paragraph 4 of page 12-1 of the ROD and should be corrected as follows: "Therefore, the remedy will include installation and monitoring of the carbon unit for one (1) year with a replacement unit to be installed at the end of the first year."

We appreciate the opportunity to comment on this document and look forward to continuing to work with the EPA to remediate this Site.

<IMG SRC 97203Y>

Attachment

cc: Philip Vorsatz
Jack Butler w/o attachment
G. Doug Rumford w/o attachment